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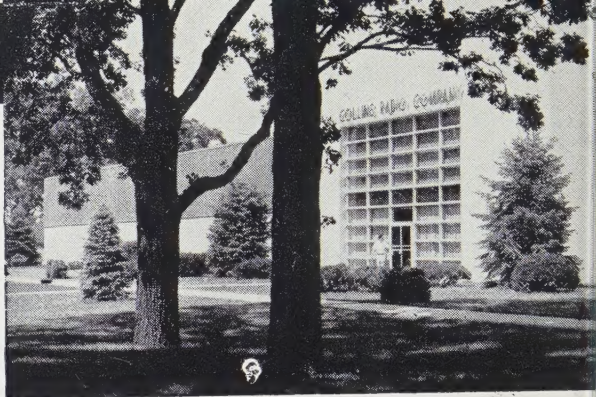
RADIO AMATEURS' JOURNAL



In This Issue =

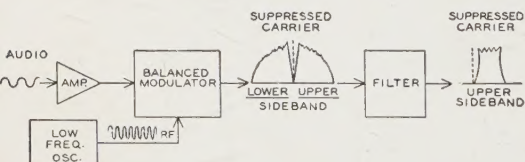
Ultimate Mobile Receiver
Common Sense Antenna Design
Home-built Heterodyne Exciter

GENERATING SSB SIGNALS



The actual generation of the single sideband signal is perhaps the most important part of a SSB transmitter. In designing this part of the circuit, careful consideration should be given to the band width of the signal generated. Without careful design, this band width can be much greater than would be expected and can cause considerable adjacent channel interference on both sides of the desired signal. The most desirable performance characteristics of an SSB generator would be the ability to generate the desired sideband, completely suppress the undesired sideband and suppress the carrier. Practical design permits suppressing the undesired sideband and carrier by more than 40 db. Following is a discussion of one way that these performance characteristics may be obtained.

The block diagram below shows a "filter" type single sideband generator.



It shows how the audio and RF signals are combined in the balanced modulator and how the filter removes one sideband. If the balanced modulator is properly adjusted, the carrier can be reduced 40 db or more. Care must be taken in the design of any balanced modulator in order to prevent the RF output from coupling around the balanced modulator and being re-inserted in a later stage. This undesired coupling can be caused by stray capacitive coupling or by coupling through common power leads. Unwanted coupling around the balanced modulator will not allow complete suppression of the carrier.

The output of the balanced modulator contains

both sidebands and has the RF carrier suppressed. All the modulation components passed by the amplifier will appear as sidebands in the output of the balanced modulator. In order to limit the transmitted bandwidth to only that required for a satisfactory communications circuit, it is necessary to restrict the passband at some point in the transmitting circuitry. This is most easily done by the filter following the balanced modulator. This filter is required to do several things. (1) It should pass the desired sideband. (2) It should limit the bandwidth of the desired sideband to that required for an intelligent communications circuit. (3) It should provide adequate suppression to the undesired sideband. (4) It should provide some attenuation to the carrier frequency. The Collins Mechanical Filter Type 457 will satisfy the above requirements. It provides a transmitted bandwidth of 3100 cps. It does not require the use of any additional audio bandpass filter. It provides at least 60 db of attenuation to the undesired sideband. No manual adjustments are required to maintain this attenuation. It will provide between 12 and 18 db of attenuation to the carrier frequency, thereby reducing the requirement for a high degree of carrier balance in the balanced modulator.

The principal advantages of the filter type single sideband generator are its ability to maintain its performance characteristics indefinitely; there are no controls, such as the critical ones required by other systems for RF and audio phasing, to get out of adjustment, and there are no critical phase shifting audio bandpass networks required. Optimum performance can be easily provided with a Mechanical Filter exciter. When operating SSSC, we should make sure that we are utilizing the advantages offered by this system and that we are operating with a single sideband, with the carrier suppressed.

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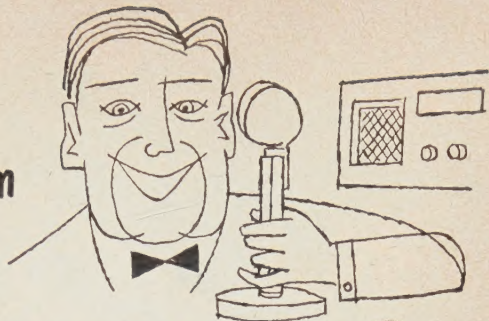
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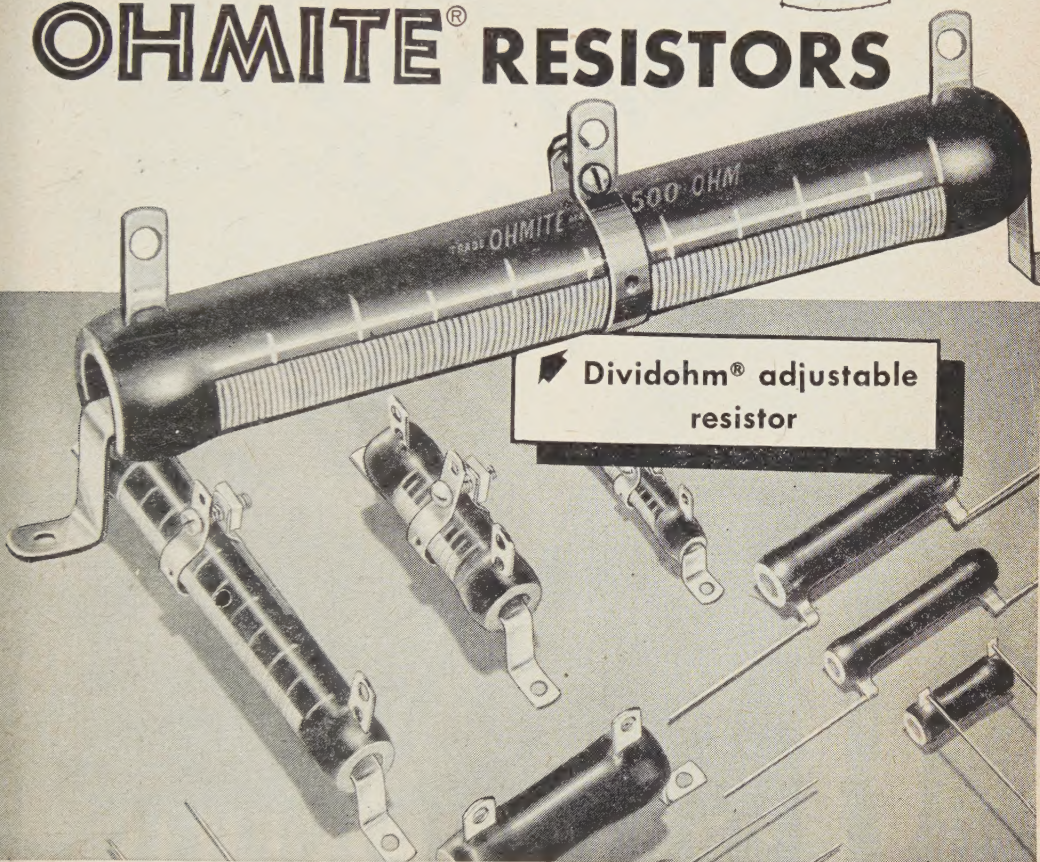
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Managing Editor

Oliver P. Ferrell

December, 1954

Vol. 10, No. 12

E. Miles Brown, W2PAU

Technical Consultant

Herbert S. Brier, W9EGQ*

William I. Orr, W6SAI**

Assistant Editors

OUR COVER PHOTO

Bobby DeGood, four-year-old
harmonic of Harold DeGood (WØARO),
calls Santa on his Dad's Ham gear.

CQ

Editorial Staff

Jack N. Brown, W3SHY

George Jacobs, W2PAJ

G. Franklin Montgomery, W3FQB

Louisa B. Sando, WØSCF

Wilfred M. Scherer, W2AEF

R. C. Spenceley, KV4AA

Contributing Editors

Thomas Smith, W2MCJ

Draftsman

Robert W. Campbell

Jeanne C. Gillespie

Editorial Assistants

Business Staff

S. R. Cowan, Publisher

S. L. Cahn, Advertising Director

H. N. Reizes, Advertising Manager

L. Steiner, Representative

D. Saltman, Production Manager

H. Weisner, Circulation Manager

Branch Advertising Offices

Ted E. Schell, 2700 West 3rd Street,
Los Angeles 5, Calif.,
DUmkirk 2-4889.

Richard E. Cleary, Commercial Bank
Bldg., Berea, Ohio, BErea 4-7719.

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Australia.

* 385 Johnson St., Gary 3, Indiana
** 555 Crestline Drive, Los Angeles 49, Cal.

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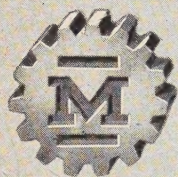
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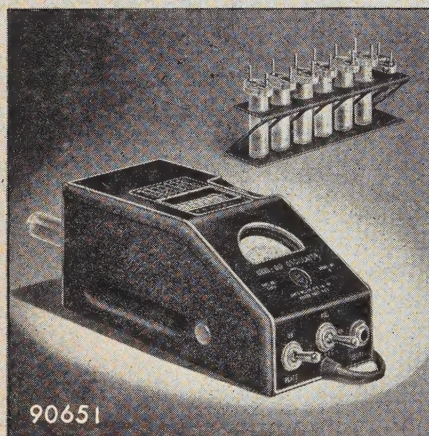
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Designed for



Application



The No. 90651 GRID DIP METER

The No. 90651 MILLEN GRID DIP METER is compact and completely self contained. The AC power supply is of the "transformer" type. The drum dial has seven calibrated uniform length scales from 1.5 MC to 300 MC plus an arbitrary scale for use with the 4 additional inductors available to extend the range to 220 kc. Internal terminal strip permits battery operation for antenna measurement.

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Last Minute DX Items

HKØ/San Andres acceptance will be made retroactive to World War II instead of May 1954 as stated in September CQ.

We have word of a Soviet expedition to the North Pole. Activity was scheduled to have started on October 31 with two stations signing *UPOL3* and *UPOL4*. These stations were active on frequencies from 7000 to 7050, VFC at the following times: Sundays, 1300 to 1500 and 1830 to 1930 GMT. Thursdays, 0100 to 0300 and 1600 to 1700 GMT. The length of their stay was not determined . . . *VQ8CE*

NAVASSA ISLAND (KC4AA-KC4AZ)

The CQ DX Committee has voted to add Navassa Island to its official country list. Credit will be given, on the WAZ/HONOR ROLL listings, for contacts dating from the close of World War II.

Chagos Islands, has been heard on 14050 (with FB8XX) at 1100 GMT . . . During the *World Wide DX Contest* disturbances were mighty unkind to the phone section. Marked improvement was noticed for the CW period with excellent 21 Mc. openings and South American activity on 28 Mc. 160 meters was disappointing however and 3.5 and 7 were below par. *W8JIN* rolled up 456 contacts for an approximate 305,000 points. Sam, *4X4BX*, was way up there again with 750 contacts and a multiplier of 250 while Bada, *OK1MB*, QSO'ed 450 with a 250 multiplier. *KV4AA* kept on the good side of the W's (I hope) by dispensing 854 contacts for a modest 113,000 while a 14-hour stint at

NEWFOUNDLAND

The committee has also decided to re-establish Newfoundland on the country list. Credit will be allowed for any contacts with Newfoundland prior to its union with Canada on March 31, 1949 (VO contacts will be re-added to all lists where formerly deleted. Others please submit Newfoundland/Labrador contacts).

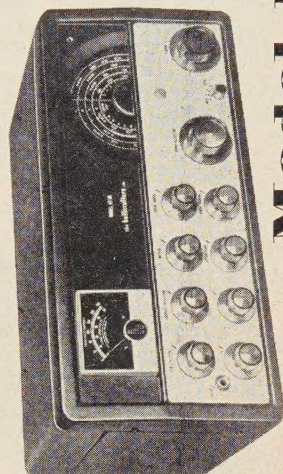
VQ6LQ resulted in 17 zones, 41 countries and 113 QSO's. To sum it up we would say "Swelling, bigger and better than ever" . . . *MP4BBL* still awaits QSL's from G-land and upon receipt will confirm 100 per cent . . . A new Ham in Nicaragua is Floridas *W4SXD*. He is on as *YN1PM*. . . Jim, ex *KP4YC* now keys from *W5GRL/5* while ex-*KP4UE*, also Jim, may be heard from Shelby, Ala., as *K4AGE*. . . Via *West Gulf Bulletin* *W1FH* says *FB8BC* and *ZD9AC* are active on 21 Mc. and *W5UUK* states that *ZS7D* is available daily on 14145 at 1600 GMT.

is the time for all good Hams to
 the pleasure of receiving one of
 world's finest gifts—a genuine
 crafters. °
 d New and very much wanted—
 el HT-30 Single Sideband AM
 CW Transmitter/Exciter.
 ghly stable VFO with full 100:1
 io gear drive system built-in,
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 ability comparable to most crys-
 s .009%.
 ll band switching.
 mple gain for 55 db microphone.
 um and noise 40 db down.
 ll 50 watt peak power output.
 mplete built-in metering.
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 o or more.
 able 50 kc filter system.
 V. I. suppressed.
 rovisions for coaxial output fitting.
 ilt-in voice control circuit with
 as switching for final amplifier.
 M—CW—SSB—19 tubes plus
 ltage regulator and 2 rectifiers.

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HAMCRAFTERS



For... *Jack*

From... *Dad*

**Model HT-30
 Coming Soon**

For many happy years

CHRYSLER CORPORATION

Heathkit GRID DIP METER KIT



MODEL GD-1B

\$19.50 Ship. Wt.
4 lbs.

with additional blank dials for individual calibration. You'll like the ready convenient and smart appearance of this kit with its baked enamel panel and crackle finish cabinet.

The invaluable instrument for all Hams. Numerous applications such as retuning, neutralization, locating parasitics, correcting TVI, adjusting antennas, design procedures, etc. Receiver applications include measuring C, L, and Q of components—determining RF circuit resonant frequencies.

Covers 80, 40, 20, 11, 10, 6, 2, and 1 1/4 meter Ham bands. Complete frequency coverage from 2—250 Mc. using ready-wound plug-in coils provided with the kit. Accessory coil kit, Part 341-A at \$3.00 extends low frequency range to 350 Kc. Dial correlation curves furnished.

Compact construction, one hand operation, AC transformer operated, variable sensitivity control, thumb wheel drive, and direct reading calibrations. Precalibrated dial

Heathkit ANTENNA COUPLER KIT

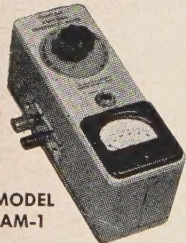
The new Heathkit Antenna Coupler Model AC-1 was specifically designed to operate with the Heathkit Amateur Transmitter and will operate with any transmitter not exceeding 75 watts RF input power. Rugged design has resulted in a sturdy, well shielded unit featuring a copper plated chassis and shield compartment. Coaxial 52 ohm receptacle on the rear of the chassis connects to a three section PL-type low pass filter with a cut-off frequency of 36 Mc. Tuning network consists of a variable capacitance and tapped inductance in an impedance matching unit. Capacity coupled neon lamp serves as a tuning indicator and will also provide a rough indication of power output.



MODEL AC-1

\$14.50 Ship. Wt.
4 lbs.

Heathkit IMPEDANCE METER KIT



MODEL
AM-1

\$14.50 Ship. Wt.
2 lbs.

The Heathkit Antenna Impedance Meter is basically a resistance type standing wave ratio bridge, with one arm a variable resistance. In this manner it is possible to measure radiation resistance and resonant frequency and antenna transmission line impedance; approximate SWR and optimum receiver input. Use it also as a monitor or as a field strength meter where high sensitivity is not required. Frequency range of the AM-1 is 0-150 Mc and range of impedance measurements 0-600 ohms. The circuit uses a 100 microampere Simpson meter as a sensi-

tive null indicator. Shielded aluminum light weight cabinet. Strong self supporting antenna terminals.

HEATH COMPANY
BENTON HARBOR 6, MICHIGAN

To Our Readers:

In a magazine, such as *CQ*, which keeps growing month after month, the point is soon reached where the publisher must consider ways and means of improving his services. Essentially speaking, he wants to get a good readable journal into his subscribers' hands well before the first of each month. We are the first to admit that in the past this hasn't always been the case.

Because of the size and distribution of *CQ* we have outgrown our present printing facilities, and starting with the January issue this magazine will be handled by one of the largest printing shops in New York City. Simultaneously steps will be taken to speed up the mailing and newsstand distribution. We could say a lot about what we plan for *CQ* in this particular vein, but we would much rather just let you see for yourself.

The January issue, which will be on your newsstand during the last week of December and which will be in subscribers' hands (Christmas mailing rush permitting) well before New Year's Day will contain both the feature story by Bill Scherer, W2AEF, on the "Q-Multiplier," and the one by Jack Brown, W3SHY, on the SSB exciter using a 50-kc. Burnell filter. The cover feature is a "Strap Set" portable, designed by W0URQ.

73,

Perry Ferrell



"The Hams have just voted me the 'Chassis With The Most Sensitive Reception.'"



New Heathkit VFO KIT

MODEL VF-1

\$1950

Ship. Wt. 7 lbs.

and electrical design insures operating stability. Coils are wound on heavy duty ceramic forms, using Litz or double cellulose wire coated with polystyrene cement. Variable capacitor is of differential type construction, especially designed for maximum bandspeed and features ceramic insulation and double bearings.

This kit is furnished with a carefully precalibrated dial which provides well over two feet of calibrated dial scale. Smooth acting vernier reduction drive insures easy tuning and zero beating. Power requirements 6.3 volts AC at .45 amperes and 250 volts DC at 15 mills. Just plug it into the power receptacle provided on the rear of the AT-1 Transmitter Kit. The VFO coaxial output cable terminates in plastic plug to fit standard 1/2" crystal holder. Construction is simple and wiring is easy.

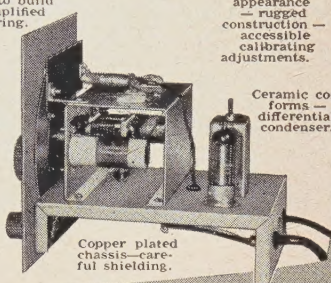
- Smooth acting illuminated and precalibrated dial.
- 6AU6 electron coupled Clapp oscillator and OA2 voltage regulator.
- 7 Band coverage, 160 through 10 meters—10 Volt RF output.
- Copper plated chassis—aluminum cabinet—easy to build—direct keying.

Open layout—easy to build—simplified wiring.

Smooth acting illuminated dial drive.

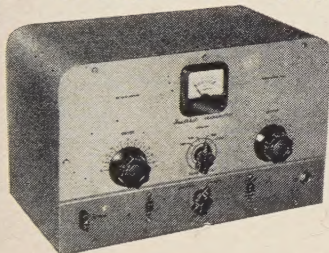
Clean appearance—rugged construction—accessible calibrating adjustments.

Ceramic coil forms—differential condenser.



Copper plated chassis—careful shielding.

Heathkit AMATEUR TRANSMITTER KIT



MODEL AT-1

\$2950

Ship. Wt. 16 lbs.

SPECIFICATIONS:

Range 80, 40, 20, 15, 11, 10 meters.
6AG7 Oscillator-multiplier.
6LA Amplifier-doubler
5U4G Rectifier
105-125 Volt A.C. 50-60 cycles 100 watts. Size: 8 1/8 inch high x 13 1/8 inch wide x 7 inch deep.

Crystal or VFO excitation.

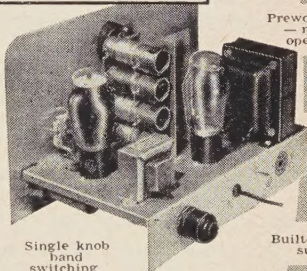
Prewound coils—metered operation.

52 ohm coaxial output.

Built-in power supply

Rugged, clean construction

Single knob hand switching



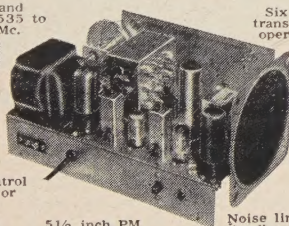
Here is a major Heathkit addition to the Ham radio field, the AT-1 Transmitter Kit, incorporating many desirable design features at the lowest possible dollar-per-watts price. Panel mounted crystal socket, stand-by switch, key click filter, A. C. line filtering, good shielding, etc. VFO or crystal excitation—up to 35 watts input. Built-in power supply provides 425 volts at 100 MA. Amazingly low kit price includes all circuit components, tubes, cabinet, punched chassis, and detailed construction manual.

NEW Heathkit COMMUNICATIONS RECEIVER KIT

Four band operation 535 to 35 Mc.

Stable BFO oscillator circuit.

RF gain control with AVC or MVC.



5 1/2 inch PM Speaker-Headphone Jack.

Six tube transformer operation.

Electrical bandspeed and scale.

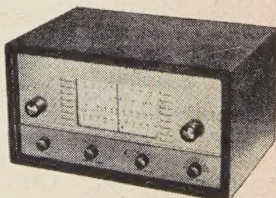
Noise limiter—standby switch.

SPECIFICATIONS:

Range.....535 Kc to 35 Mc
12BE6 Mixer-oscillator
12BA6 I. F. Amplifier
12AV6 Detector—AVC—audio
12BA6 B. F. O. oscillator
12A6 Beam power output
5Y3GT Rectifier
105-125 volts A.C. 50-60 cycles, 45 watts.

A new Heathkit AR-2 communications receiver. The ideal companion piece for the AT-1 Transmitter. Electrical bandspeed scale for tuning and logging convenience. High gain miniature tubes and IF transformers for high sensitivity and good signal to noise ratio.

Construct your own Communications Receiver at a very substantial saving. Supplied with all tubes, punched and formed sheet metal parts, speaker, circuit components, and detailed step-by-step construction manual.



MODEL AR-2

\$2550

Ship. Wt. 12 lbs.

CABINET:

Proxylon impregnated fabric covered plywood cabinet. Ship. weight 5 lbs. Number 91-10, \$4.50.

HEATH COMPANY
BENTON HARBOR 6, MICHIGAN

HERE'S YOUR KEY TO SSB



Single Sideband Generator

FOR B & W'S MODEL 5100 TRANSMITTER

Single sideband transmission, with its superior effectiveness over AM and its elimination of heterodyne interference, is yours with B&W's new Single Sideband Generator, Model 51SB. Used with the B&W Model 5100 Transmitter, this generator offers you:

- SSB bandswitching operation on 80, 40, 20, 15, 11, and 10 meters
- 150 watts input on SSB and CW, 135 watts on AM phone
- VFO or crystal control on AM, CW, and SSB
- Voice control operation on SSB
- Speaker-deactivating circuit
- Completely self-contained — except microphone
- Simple to install
- No test equipment required for installation or operation

The Model 51SB Single Sideband Generator converts a B&W Model 5100 into a band-switching single-sideband suppressed-carrier transmitter—with all the advantages of SSB plus the AM and CW features already built into your Model 5100. Its construction is completely unitized. Equipment removes easily and disassembles into three major sub-assemblies: the R-F Unit, the Audio Unit, and the Main Chassis Unit.

Factory wired and tested, the 51SB comes to you complete with tubes—all set to convert your Model 5100 Transmitter to SSB. This combination provides a superlative driver for any high-powered linear amplifier! Write for descriptive Bulletin 51SB.



Information regarding the application of the Model 51SB Single Sideband Generator to other composite transmitters having certain required characteristics will be made available in the near future. Send name and address for Bulletin 51SB.

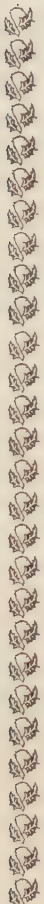
B&W

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237 FAIRFIELD AVE. • UPPER DARBY, PA.

A Very, Merry Christmas . . .

A Ham's Christmas



'Twas the Night before Christmas, and in the Ham shack
Was the warm glow of tubes in the transmitter rack
The logbook was brought up to date with great care
In case the FCC might someday be there.
XYL and harmonics were snug in their beds
(No Tennessee Indians to addle their heads)
I plugged in the mike and my new VFO
Getting all set for a nice QSO
When from the relays there rose such a clatter
I yanked the big switch to see what was the matter.
Then up on the roof by the two-meter beam
There came QRM like a heterodyne scream:
"On Gonset, on Babcock; On Viking and Elmac!
On Ranger, on Collins! On Heathkit and Eimac!
Bias to the grid and volts to the plate,
Just watch that S-meter while we all modulate!"
As I turned to the rig and reached for a dial
From the antenna tuner Santa slid with a smile.
An RF choke he held tight in his teeth
And coax encircling his head like a wreath.
A bundle of Hamgear he had flung on his back—
Was that my name on a new power pack?
He had a stub nose like an egg insulator
And his cheeks glowed bright red like a hot oscillator.
He spoke not a word, but went straight to his work
Laying out all the gear, then turned with a jerk
And, laying a wavemeter alongside his nose
Said "Pse QSL?" and up the feeders he rose.
He climbed up the dipole, to his team gave a whistle
And away they all flew like a jet-propelled missile.
But I heard his last signal from the ionosphere:
"Seventy three; Eighty-eight! And a Merry Xmas!"

Walter A. Tompkins, K6ATX

. . . From the Staff of CQ

K6AFL
K6ANN
K6BAS
K6BCM
K6BJ
W6AY
W6BAX
W6BET
W6BMU
W6CBN
W6CEO
W6CHE
W6DJI
W6DUW
W6DYB
W6DWM
W6FBR
W6FKS
W6FYM
W6HBB

W6HHN
W6INJ
W6JFV
W6KEV
W6KFQ
W6KM
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W6QIT
W6QQV
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W6SC
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W6ZPH
W7SLC
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W2QA
W4AGD
W7ESK
W4TO
W6QD

W6ENV
W6JBC
W9AIO
W9DZY
W0NWW
W0RPE
W0AZT



Common Sense

Yagi
WINDOM
Rhombic
3-el

ANTENNA DESIGN

Robert W. Schoening, WØTKX



Bob Schoening was a teenager when licensed in January 1935. Since then WØTKX has gathered in Class A (1936), Extra Class (1952) and FCC radar, telephone (first) and telegraph (first) licenses. His favorite bands are 20, 40 and 80 CW, plus 6 and 2 meter phone. A number of Ham awards have been presented to WØTKX and include DXCC, WAS, BPL, A-1 Opr. Club, Public Service, 6-meter "Project RASO" and area SS and CQ contest certificates.

he state of Nevada is needed to complete a 50 Mc. AS. Bob is not mobile at present. Likes to design equipment, but not too keen on building it up. Member of both the Minneapolis and St. Paul Radio Clubs. Currently employed as Supervisor, Radio Communications, Northwestern Television and Electronics Institute, Minneapolis, Minn. Home Address: 10040 Brookside Ave., Minneapolis 20, Minn.

om time to time, new antenna designs for h superior radiating properties are claimed, announced to the amateur fraternity—a p which, fortunately, is always searching something better. The "magic" of these ns is supposedly due to an unusual dimen- method of feeding, angle of inclination, ven (heaven forbid) a terminating resistor h hungrily consumes a portion of the power to the antenna. Since anything from the us "wet string" to an underground vertical radiate, the practical results obtained with antennas are often much better than theory t predict.

r loud signals on the lower frequency s, I advocate the use of a "multi-band" ana in conjunction with an appropriate

tuning system. With this system properly ad-justed, results should at least equal those obtained from carefully pruned single frequency designs. The flexibility and simplicity of construction offered by "multi-band" antennas should be attractive—especially to the new-comer concentrating on eighty and forty meters.

Radiation and Signal Strength

Signal strength is determined by many variables. The most important of these over which we exercise some control, are antenna size and location, transfer of power from the transmitter to the antenna, and transmitter power. The antenna dimensions are usually influenced by where we live: How high the trees (or other natural supports) are, what part of the lot offers a clear area for the flat-top span, and other uncontrollable factors. The effect of transmitter power on signal strength is 100% predictable, but not nearly so pronounced as many of us think. The difference between 1000 watts and 75 watts input (all other things being equal) will not be the difference between a "very loud" and a "weak" signal. It will tend to be the difference between "loud" and "loud-er," or "weak" and "weaker" signals, as other conditions dictate. This leaves one completely controllable variable which exerts tremendous influence on signal strength: Getting the transmitter's output into the radiating system. This area of adjustment and design is well worth the application of a great deal of time, effort, and imagination. Fortunately, it's inexpensive.

Directional patterns of low-frequency antennas used by the average amateur usually differ from reference book patterns, which are for ideal locations. Since directional properties are to some extent unpredictable, they should be important considerations only for special antenna designs. Vertical antennas, beams, and special systems for the higher frequencies are not covered in this article.

Your "flat-top" is the actual radiator, and its location should be carefully selected. Surrounding the wire is a storage area from which the radiated energy must be extracted. Trees, power lines, house wiring and plumbing, and other questionable conductors in this area may cause a considerable loss of radiated power. While it should run essentially straight throughout its length, bending and tilting (or otherwise detouring) the antenna to avoid running close and parallel to tree branches or metal objects is advisable when necessary. Bending and folding the flat-top merely to get additional length of wire, however, may actually reduce its radiation. Wires which may or may not slant, and are not over 25 to 40 feet high, frequently will outperform perfectly horizontal antennas at great heights, when used for ordinary low-frequency amateur communications. Flat-top length is not critical. In general, the longer a wire is, the more it will radiate. Chopping ten feet from a 140-foot radiator to make it resonate, for example, will reduce its performance.

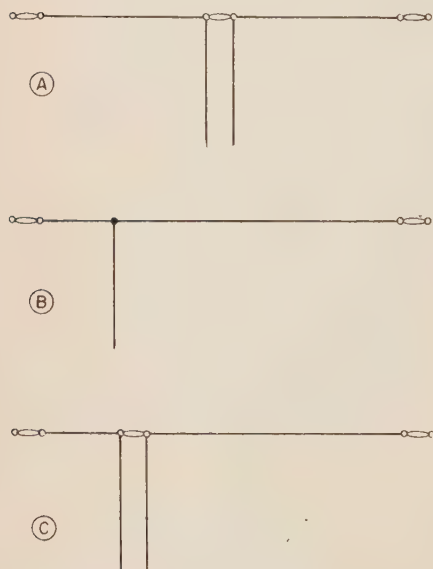


Fig. 1. Three of the most common and most useful methods of feeding a flat-top. As completely outlined in the text, the length of the flat-top is not as critical as many Hams have been led to suppose. Also, the exact point of feeding the antenna is not of really great importance. It should be determined by the position of location of the shack. The over-all lesson is to get as much wire into the air as practical.

Although the difference would not be noticeable. Cutting off ten feet to keep the clear of foliage around a supporting tree would seem like a good idea. Antennas less than a 100 feet long tune critically in the lower frequency bands, while those much over 200 feet long begin to develop directional characteristics which may not be desired for general work.

Feeding the Flat-top

The flat-top may be broken with an insulator at any point, and a two-wire feed line connected. Alternatively, a single-wire feeder may be connected at any point along the antenna without breaking the flat-top. Home-made two-wire transmission line using #12 to #18 wires or plastic hair curlers or ceramic feeder spreaders is excellent. Commercially manufactured open wire lines are often less expensive, but forget the type made with "Copperweld" (such as Buchan LL300 line manufactured by WOTJF). Solid dielectric TV type "twin-lead" costs almost as much, and is mechanically and electrically inferior to open-wire lines; therefore its use is not recommended. Multi-band antennas using coaxial feedlines involve rerunning, switching, or other design complexities. Care is not suitable for working into the range of load impedances suggested here; but if the feed line must run underground, through long pipes, shafts, or ducts, or elsewhere in a manner not applicable to open wires, special antenna designs will be required. At seven megacycles, there is no appreciable loss in either ten feet of badly mismatched, balanced open-wire line, or perfectly matched coaxial cable of flexible type. Badly mismatched co-ax, however, will cause a noticeable reduction in signal strength. The location of the "shack" in relation to the flat-top should influence your choice of feed system. Some common methods of feeding an antenna are shown in Fig. 1.

Figure 1a shows the balanced doublet, which tunes easily, has a non-radiating feed system (possibly discouraging some types of TVI), and has a somewhat more predictable radiation pattern than any of the others.

Figure 1b shows the single-wire-fed antenna which usually gives excellent results. Feeding may be accomplished at any point, but when the feeder is tapped approximately one-half wavelength from the end of a half-wave flat-top this system is called a "Windom" antenna. If the feeder is tapped on either end, it is obviously a part of the flat-top—this is an "end-fed" antenna.

Figure 1c depicts the "unbalanced doublet." If the feed-line is placed at the extreme end (with one feeder open at the top) of a flat-top which is an integral multiple of a half wavelength, this system becomes a "Zepp" with an unbalanced feedline. The unbalanced doublet has no particular advantage over the less-expensive

single-wire-fed system for ordinary installations. Neither is as good, theoretically, as the balanced doublet; both are widely used and produce good signals.

Now, buy some wire and insulators, and hang up the sky-hook. Measure it if you like, though that will not necessarily help your signal strength. None of the dimensions shown in Fig. 1 are critical. Use convenient and appropriate lengths, employ good mechanical construction, and make all electrical connections solidly and permanently. Observe the same precautions with the feed-line, especially if it is unbalanced, as with the flat-top. Keep the line short and direct, and a reasonable distance from the building, foliage, or metal masses; carefully insulate where it comes through the wall.

Earths, Grounds and Images

For any antenna system, the effect of the earth is as if a similar system existed like a mirror image the same distance below the actual ground that the radiator is above it. For single-wire feed systems, a connection must be made, in effect, to this "image." Often, when all of the large metal objects in the station (such as receiver and transmitter cabinets) are bonded together, their combined capacity to the earth will bring them near ground potential. Most units have power-line by-passes which parallel this capacity with a power-line ground. These effects in combination have enabled even single-wire-fed antennas to work with no actual ground wire, but this is a highly undesirable condition—the power-line by-pass capacitors are being used to feed some r-f energy into the line, although they are intended for just the opposite purpose. If it is impossible to ground your equipment with a short, direct, large size conductor to a good ground, try several wires of various lengths to different ground connections, tying all of them in parallel to the station ground.

In some installations—particularly "upstairs" shacks—a "cold" ground seems hopeless. This is particularly noticeable above seven megacycles where ground lead length becomes impor-

tant, and below about 30 megacycles where stray capacity grounds begin to become effective. In these cases, the "hot" ground wire should be insulated with as much care as the antenna feeder. The transmitter and receiver chassis may then be connected to a "false ground." This is made with a single-layer coil having four or five times as many turns as the coils used to tune transmitter circuits to a given band, and having one end connected to the ground wire. The chassis are tapped on some "cold" point along the coil. The ground lead for single-wire-fed antennas, especially short ones, may carry considerable current. Getting a good low-resistance connection to the actual earth will be well worth while in these cases.

Figure 2 shows the schematic diagram of your transmitter as the antenna sees it. It is simply an a-c generator. Some transmitters have one output terminal grounded (such as those using co-ax connectors for output terminals). Other rigs (swinging link output types, for example) have neither terminal grounded, but in most cases, one terminal may be grounded if desired. Either type is generally designed to feed r-f power into a nearly "pure" (free from inductance and capacity effects) resistance of 30 to 500 ohms, unless otherwise specified in the manual accompanying commercially designed transmitters.

Equivalent Circuitry

Figure 3 shows the simplest equivalent electrical circuit of your antenna. A, B, and C are for single-feeder systems. D, E, and F are for balanced doublets. The equivalent circuits for unbalanced two-wire feed systems will resemble D, E, and F except that the ground point (shown, but not actually physically connected to the antenna) will not be at the electrical center of the network, nor will the inductance and capacity effects be equally distributed as shown. Which of the diagrams applies to your specific antenna may be determined by experiment.

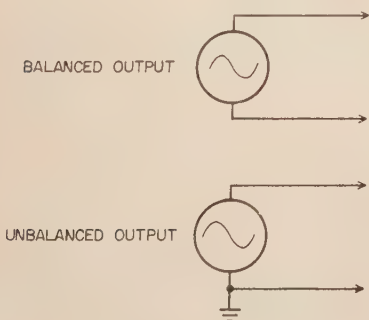


Fig. 2. Your transmitter as seen by the antenna.

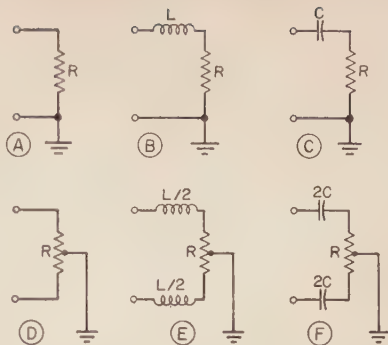


Fig. 3. These are the equivalent electrical circuits of single-feeder (A, B and C) and balanced (D, E and F) antennas. See text for details.

The sizes of L , C , and R in the equivalent diagrams (Fig. 3) vary widely depending upon the antenna dimensions and transmitter frequency. The primary objective of an amateur station is to get power from the generator (Fig. 2) into the resistor portion of Fig. 3. If directly connecting the antenna terminals to the transmitter doesn't produce optimum results (it seldom will), either the resistance is the wrong value, or the effects of the equivalent inductance and capacity are too great. L and C can not absorb power themselves, but they can effectively keep it out of the resistor. By the way, the resistor shown is not the famous "radiation resistance," but is the "input resistance" for the antenna system. It is not essential to know its value, but relatively simple methods for determining resistance values at a given radio frequency have been described in CQ.¹

The effects of the undesired inductance or capacity are nullified by using a resonant antenna tuner. Resistance values (for a.c.) are changed by using transformer action, readily obtained with a simple antenna tuner.

Why the Antenna Tuner

In addition to the two functions mentioned above, the antenna tuner will discriminate against the transfer of harmonics into the antenna, and against the associated menace of TVI.

A further characteristic which may be called the " Q " of the antenna tuner must also be considered. The three main functions of the tuner may be performed with different values of Q . If the Q is too high, however, power may be lost in the tuner; furthermore it may require too-frequent retuning as frequency changes are made within a given band. If the Q selected is too low, some harmonic attenuation may be sacrificed. It is better to err in the "too low" direction—indicated by very broad tuning of the tuner. This characteristic should not be confused with the " Q of the coil" which is a factor of merit, and should be as high as possible. The coil used with an antenna tuner must be wound with the largest convenient size of wire, and all connections should be well soldered, or be solid contacts between clean surfaces. Antenna tuning capacitors having the same plate spacing (voltage rating) as those in the transmitter's final amplifier plate circuit are usually adequate. Inductance and capacity values are usually similar to those used in the final amplifier. Manufactured inductors rated at less than 250 watts are generally unsatisfactory, even for low power levels.

Let's assume that the r-f energy is carried from the transmitter to the tuner through a low-impedance unbalanced transmission line, such as coaxial cable (with one side grounded). This

"output line" should be no longer than necessary, since certain adjustments at the tuner come more critical as the length of the line increases.

Equipment essential for proper antennaing includes a neon bulb. This will indicate the presence and relative amplitude of r-f signals. Grounded points should, of course, be "cold" (no r-f voltage). Antennas which exhibit a low impedance (voltage to current ratio) are called "current fed," and little relative indication of r.f. on the feeder(s) will be apparent while "voltage fed" (high impedance) antenna will cause the bulb to light brightly near the feeder(s) when they are in operation. For a given antenna, the most voltage obtainable on the feeders usually indicates the best operation, but whether this "most" voltage is high or low has nothing to do with the effectiveness of the antenna.

Before attempting the adjustment of an antenna, it is well to connect the output end of the transmitter output line to an ordinary 100-watt lamp bulb, or other appropriate dummy load. An excellent discussion of the use of light bulbs as dummy load resistors appears in a previous issue of CQ.² Operating into a dummy load, record all of the pertinent transmission dial settings for normal full loading. The settings eventually used when working into the actual antenna, should not depart appreciably from these recorded readings.

When making adjustments, it is necessary to radiate a signal which may cause interference. If possible, reduce the final amplifier plate voltage (also the screen voltage, in the same manner if the tube has a screen grid) during adjustment. A plate current which is the same percentage of normal full-load operating current as that the reduced plate voltage is of the normal full-load, may be considered full-load current when operating at reduced power. Power reduction will seldom prevent much interference, so do your testing on a clear channel—never during busy operating periods. Listen frequently, signing your call at the required intervals.

Antenna Tuner Design

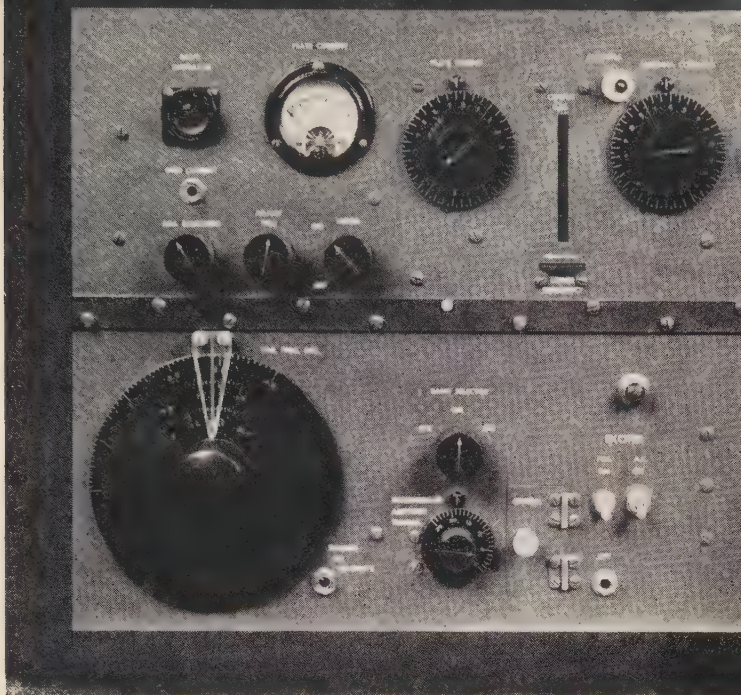
Figure 4 shows some of the possible circuit arrangements for antenna tuning. Figure 4a is for unbalanced antenna systems with single-wire feed, and Figure 4b is for two-wire feed systems. 4b and 4d are respectively alternative systems called "capacitive coupling." Capacitive coupling gives superior harmonic attenuation, as well as a smoother range of adjustments, but the initial design is more critical. The antenna tap " Z " for balanced systems is effectively varied from a high value

2. John J. Nagle, W3JES, "Power and Resistance Ratings of Incandescent Light Bulbs," CQ, Jan., 1951.

1. William I. Orr, W6SAI, "The Matchmaker" CQ, Dec., 1951, p. 27.

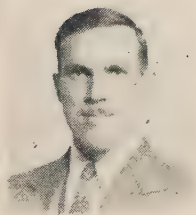
[Continued on page 60]

My



"FINAL" EXCITER

Carlton G. Rich, W8ZYG



W8ZYG became interested in Ham radio during his high school days but did not become licensed (as W9STU) until 1941. After a war time stint in the Merchant Marine, he moved to Port Huron and took a Class A. The principal interest at W8ZYG has always been building and tinkering with equipment rather than actual operation. However, 40 and 80 are his favorite bands. In 1951, Mr. Rich was appointed head of communications in Port Huron's Civil Defense organization. He also attended the FCDA Staff College in Olney, Md. W8ZYG is employed as an inspector in the U.S. Immigration Service. Home Address: 3318 Stone Street, Port Huron, Mich.

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We moved recently—to a brand new location, with brand new, polite, friendly, *neighborly* neighbors—and I just didn't have the heart to set up the old rig. Most of our new-found friends' houses sport tall TV masts, for adequate fringe-area reception of the Detroit stations 60 miles away. Compounding the problem was the fact that the channels in use are 7 (not so bad), 4 (a little worse), and 2 (ter-

rible!). The old rig definitely would not do. Even at the old location it attained such notoriety that the kids couldn't stroke the family cat on dry days without precipitating a prompt jangling of my phone.

The exciter described below seems to be the answer to this particularly ticklish TVI problem. Even with its final amplifier it can be operated right in the same room with the TV set without causing any detectable interference.

The evolution of a really adequate solution to the TVI problem produced a few very welcome bonus features. The "crystal-controlled" v-f-o-exciter turned out to be a versatile unit.

With the insertion in the crystal oscillator socket of a Ham-band crystal, it becomes a straight-through crystal exciter. With the insertion of the proper heterodyne-frequency crystal in the socket, it becomes a v-f-o exciter. In either case, keying is crystal-clear, for only the crystal oscillator circuit is keyed. In the unit here, a single crystal covers 80 and 20 meters, with a second crystal covering 40. Stability is excellent, dial-spread is uniform on all bands,

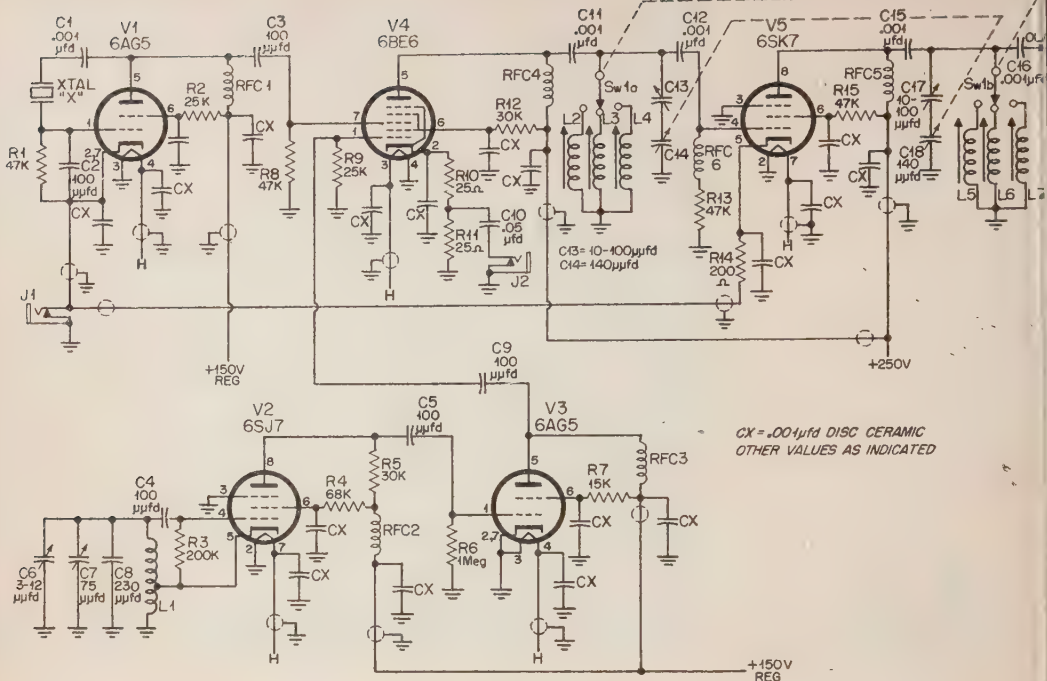


Fig. 1. Parts list and wiring diagram of the heterodyne multi-band v-f-o unit.

and the parts are inexpensive. All tubes are standard receiving types.

How were the problems of harmonic-rich multiplier stages solved? By the easiest way—avoidance. No multipliers.

But isn't it a multi-band exciter? Yes.

And is there no stability problem? Yes, there is no stability problem. The variable-frequency oscillator operates in one range, relatively low in frequency, chosen for optimum circuit conditions, stability and simplicity.

How does it sound on CW? Crystal-clear, because the variable-frequency oscillator remains isolated and undisturbed. A voltage-regulated crystal oscillator is the stage keyed. The v.f.o. runs continuously on CW, but produces no interfering signal in the receiver when the key is up, because it operates outside the band. And the keying is just as clean on the highest-frequency range, for there is no multiplication of minute variations in the oscillator's output frequency. This means that if NBFM is incorporated, the deviation control will require no readjustment with a change in bands.

Also, the bandspread on the highest band is not cramped, but is the same as that on all the bands. 100 kc. on any band covers the same number of degrees on the dial.

Would this be a good rig for the Novice? Yes, since it can be used as a straight-through crystal oscillator by simply plugging the desired Ham-band crystal into the crystal socket. The v.f.o. tube need not even be in the circuit and the Novice could ignore this part of the circuit until he is ready for general class operation.

- C1, C11, C12, C15, C16—0.001 μ fd., mica.
- C2, C3, C9—100 μ fd., mica.
- C4, C5—100 μ fd., zero-temperature coefficient ceramic.
- C6—3-12 μ fd., ceramic trimmer.
- C7—75 μ fd., variable.
- C8—Parallel combination of zero-temperature coefficient ceramics to equal 230 μ fd.
- C10—0.05 μ fd., tubular, 400v.
- C13, C17—10-100 μ fd., ceramic trimmer.
- C14/C18—140 μ fd., dual variable, Ham-lund HFD-140.
- Cx—0.001 μ fd., ceramic disc condensers, 18 required.
- J1, J2—Closed circuit phone jacks.
- L1—17 turns, #16 on grooved ceramic form, 1 1/2" dia., space wound by wire diameter. Tapped at 6th turn.

- L2, L5—44 turns, #24 enam., closewound on 1/2" dia., plastic form with adjustable iron slug.
- L3, L6—22 turns, #24 enam., closewound on 1/2" dia. plastic form with adjustable iron slug.
- L4, L7—12 turns, #24 enam., spaced over 1/2" length on 1/2" dia. plastic form with adjustable iron slug.
- R1, R8, R13, R15—47,000 ohms, 1/2w.
- R2, R9—25,000 ohms, 1/2w.
- R3—200,000 ohms, 1/2w.
- R4—68,000 ohms, 1/2w.
- R5, R12—30,000 ohms, 1/2w.
- R6—1.0 megohm, 1/2w.
- R7—15,000 ohms, 1/2w.
- R10, R11—25 ohms, 1/2w.
- R14—200 ohms, 1/2w.
- RFC1, RFC2, RFC3, RFC4, RFC5, RFC6—5 mh., 100 ma., r-f choke.
- Sw1—Two-gang ceramic insulated tap switch.

How many tuning controls on this exciter? Two. Set the main dial to the desired frequency then peak the output control for maximum grid drive of the final amplifier stage.

The heterodyne principle is not new. Nearly every amateur receiver uses a heterodyne frequency converter. Some single sideband transmitters utilize the principle. But its use in conventional transmitters is practically unknown.

and ignorance of the virtues of such use in this age of TV and more exacting standards is vast. Not quite abysmal, but vast. And it is so simple.

The Heterodyne Circuit

Mathematically, the rig is simple, involving only addition or subtraction. No multiplication.

The output is either the sum of or the difference between two frequencies generated by a crystal-controlled oscillator and a variable oscillator, whose outputs are run through a mixer tube and then amplified. The variable oscillator always operates over the same band of frequencies, outside any Ham bands, so it can run continuously, thus minimizing drift. Yet during "standby" or "key-up" periods, it does not put an interfering signal into the receiver. The different Ham-bands are reached by plugging in appropriate crystals, and selecting the desired sum or difference frequency in the gang-tuned mixer and buffer stages. Thus no harmonic-generating multiplier stages are necessary. This feature, and the use of low power throughout, are the reasons why harmonic output is negligible.

In planning the exciter, much adding and subtracting of possible crystal and v.f.o. frequencies was done in attempting to derive amateur-band heterodyne signals from a circuit fulfilling these requirements:

1. The variable oscillator should run at a reasonably low frequency, in the interests of stability.
2. Neither oscillator should operate close to any Ham band, since the output tuning might not be sharp enough to prevent some amplification and radiation of the oscillator's signal outside the bands.

These requirements conflict somewhat, and a compromise is necessary. For example, it would be nice to hit 3500 kc. by using a 2500-kc. crystal and setting the v.f.o. at 1000 kc. But to hit 14,000 kc. with that same dial setting, a 13,000-kc. crystal would be needed, and probably some of the 13,000-kc. energy would get to the antenna. It certainly would if any attempt at broad-band tuning were made.

In this unit, the final decision was to use a v.f.o. range of 5000 to 5500 kc. With a 9000-kc. crystal in the socket the difference frequency yielded by mixing the outputs of the two oscillators would be from 4000 to 3500 kc. The sum of the frequencies 9000 and 5000-to-5500 kc. yields a heterodyne signal from 14,000 to 14,500 kc. Thus we get coverage of 80 and 20 meters with one crystal.

A war surplus 1950-kc. crystal provides 40-meter output from 6950 to 7450 kc. However, now note that on 80 the dial reads backwards as compared with 40 and 20. A real purist would buy another crystal ground to 1500 kc. and then on all three bands the frequency would increase with clockwise rotation of the dial.

80, 40, and 20 meters were the only bands used in this unit, although the principle may be used on any bands desired. There is no

magic in the particular frequencies used here. The prospective builder can devise many combinations of crystal and variable oscillator frequencies that will work well in a unit like this. There are still available a number of war-surplus crystals that can be used, bearing in mind the above-mentioned basic requirements. Most surplus crystals are ground to odd frequencies, so that the band edge and kilocycle marking on the dial may not coincide for the various bands.

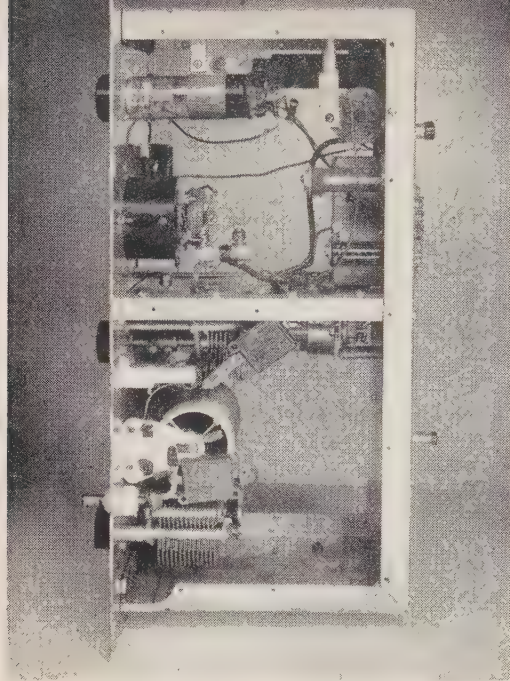
One drawback might be the seeming complexity of the circuit. Five tubes are used, but there is nothing intricate about any of their circuits, as a glance at *Fig. 1* will show. *V1* is a simple 6AG5 crystal oscillator circuit, and *V2* is a conventional Hartley v.f.o., foolproof and easy to adjust. *V3* is the untuned v-f-o buffer, *V4* is a conventional pentagrid mixer, and *V5*, a tuned buffer-amplifier. Individual slug-tuned coils simplify the tracking of the output stages over the various bands. Output on 20, 40, and 80 is just a little more than enough to drive a 6146, or similar tube. Those are the bands which interest the author, and the other bands were left out primarily because of space limitations in the cabinet. There seems to be no reason why it could not cover other bands such as 160, 15, and 10, given suitable crystals, sufficient space, and enough positions on the band-change switch.

In the original unit an attempt was made to use pi-network coupling between stages and to suppress harmonics through loose coupling and the by-pass effect of the output capacitor. This accounts for a few of the unused holes showing in the pictures. While this theory is undoubtedly correct, since there appeared to be no appreciable harmonics, the coupling was so loose that the exciter did not have the required output. The pi-network confused the tracking problem, too.

Fortunately, it was found that the pi-network coupling was unnecessary, and the conventional coupling method shown in the circuit diagram was adopted.

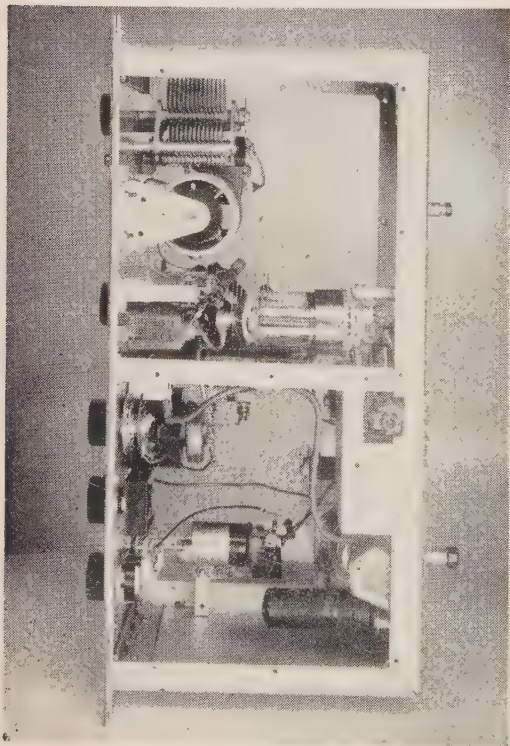
Construction

As shown in the photographs, the exciter and final are built into two surplus BC-375 tuning unit frames, with the exciter in the lower unit. On the left is the v.f.o., in its own compartment and built on the cover of a surplus jack-box which is bolted to the end wall like a shelf. A trimmer, *C6*, is provided to keep the dial marks accurate as the years roll on, tubes are replaced, etc. It can be adjusted with a screwdriver through a hole in the rear of the case. The main dial is a planetary type taken from a BC-375 tuning unit. A 6" aluminum disc replaces the smallish numbered part of the original dial assembly. All the dials were painted black and the marks put on with dime-store aluminum paint and an ordinary pen. The calibration



Above: View of the final amplifier stage with the top panel removed.

Below: Looking into the bottom of the final amplifier.



was done with the v-f-o trimmer at half-capacity so correction can be made for drift in either direction. Normal precautions were taken to do a good job of mounting the v.f.o. parts solidly. The oscillator coil was wound on a ceramic form, grooved to minimize wire movement. The variable condenser has good bearings and no play in the shaft. Any necessary shaft extension should be made of brass or aluminum, so the set screws can bite in to prevent slippage. There isn't too much heat generated by the tubes, but fairly thorough ventilation should be provided.

The untuned-buffer tubes run continuously with the variable oscillator and isolate it from keying effects. It will be noted that the 6SK7 output tube is keyed with the crystal oscillator, via jack J1, because with the key open there is little grid bias to hold its plate current down.

The crystal oscillator is well shielded and shares the front center compartment with the mixer tube. This is to keep the crystal signal from going anywhere but to the mixer grid. The oscillator components and wiring are housed entirely within a jack-box, the open end of which faces the front panel, while the open side is closed by the partition shielding the power supply section. Even the crystal is inside, with access to it through a door in the front panel, although this degree of precaution is probably unnecessary.

The 6BE6 mixer tube is tucked in the corner of the front compartment near the v.f.o. and the 6SK7 amplifier is isolated in the rear compartment. The dividing partition shields the two stages from each other. The dual tuning condenser and 2-gang band switch project through the partition, and are mounted on brackets made from $\frac{3}{4}$ " x $\frac{3}{4}$ " aluminum stock. Liberal use of these aluminum angle brackets is made throughout the chassis.

Ample shielding, rigid mounting of parts and use of short leads are primary considerations in the layout of this chassis. Liberal use of shielded hook-up wire and .001 μ fd. bypass disc ceramics, as shown in Fig. 1, is advised. Sheet copper is used for practical, not aesthetic reasons. The tubes and their relative components were mounted and wired on individual sheet copper sub-assemblies, with all ground connections made by soldering to the nearest point on the copper. Then the various sub-assemblies: tuning condenser grounds, coil grounds, etc. that carry r.f. were connected by copper sheet or straps as wide as possible, with all joints soldered. Thus we need not depend for conduction of r.f. upon aluminum, with its bolted joints and possibly poor connections. The sheet copper is soft, easily-worked roof flashing material, obtained from a lumber yard. As it quickly conducts heat away from the soldering iron it is better wherever possible to do the soldering to the copper before it is bolted to the cold aluminum.

The dual tuning condenser, *C14-C18*, is a *Hammarlund HFD-140*, chosen for its suitable dimensions. To reduce its effective capacity, and to provide a convenient means of adjusting the tuning rate and range of the condenser, the series trimmer condensers *C13* and *C17* were installed. An *HFD-100* or similar condenser might be used, and *C13* and *C17* could be eliminated.

The slug-tuned forms used were surplus items. The awkward mounting flanges were cut off and the forms were cemented into $\frac{1}{2}$ " holes drilled in a $\frac{1}{4}$ "-thick sheet of clear plastic. A commercially-available $\frac{1}{2}$ " diameter slug-tuned form should work just as well.

Assembly

The exciter power supply, *Fig. 3*, is included in the exciter chassis shown here. This was installed first. Next the two oscillators were assembled, mounted in place, and tested. Then the remaining two partitions, the one behind the dial and the one parallel with the panel, were made, fitted in the case, then removed, still fastened together and forming a "T". All the 6BE6 and 6SK7 mounting and wiring, including the bandswitch and tuning condenser, was done on the T-shaped assembly before it was mounted permanently in the case. Then all that remained was the power, input, and output wiring.

Output from the exciter was originally fed through a short length of co-ax, but when it was decided to mount the final amplifier above the exciter the co-ax was discarded because its capacitance acted as a by-pass across the output, even though its effect was minimized by the large capacitance as *C16*. To achieve tracking, a matching capacitance was required across the mixer output and the *C/L* ratio was higher than wanted. Now the output signal travels up a short piece of stiff copper wire directly to the grid circuit of the 6146 in the upper unit. The connection is made by a phone-tip jack mounted in the bottom of the upper unit so the wire plugs into it. If a builder wants to use co-ax to an amplifier some distance away he should remember either to provide a balancing capacitor and to adjust the coil turns accordingly, or to use link coupling.

Tuning and adjustment of the completed exciter unit requires only two, or even one, volt- or milliammeters, and the station receiver plus whatever frequency-metering equipment is available for calibrating the v.f.o. dial.

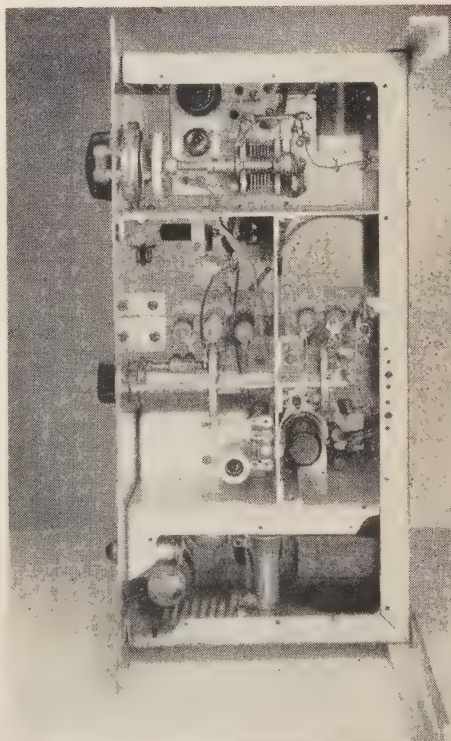
Calibration

The 5000-kc. band-edge point can be spotted by zero-beating with WWV. Phone jack *J2* is then utilized in calibrating the v.f.o. If any crystals can be found whose frequency falls within the range covered by the v.f.o. they may be plugged into the crystal socket and with earphones plugged into *J2* an audible beat note will be heard as the v.f.o. dial is brought near



Above: View of the exciter portion as seen without the bottom plate.

Below: A top view of the exciter.



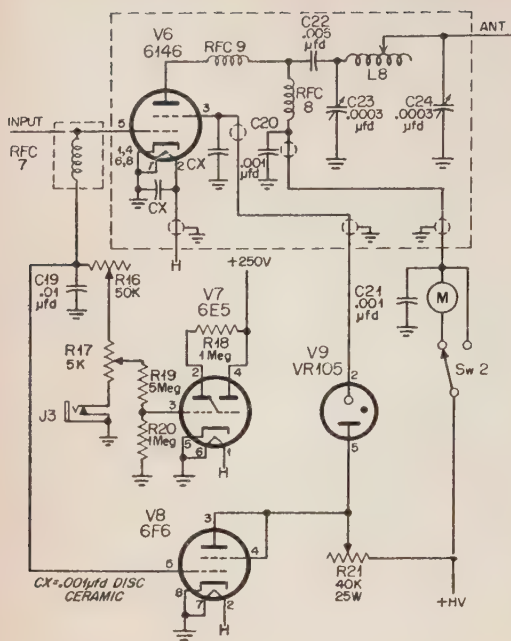


Fig. 2. Final amplifier used by the author.

C19—0.01 μ fd., mica, 400v.
 C20, C21—0.001 μ fd., 2500v. test.
 C22—0.005 μ fd., 2500v., test.
 C23, C24—300 μ fd. (approximate), variable.
 J3—Closed circuit jack.
 L8—Roller-type variable coil assembly from BC-458 "Command" transmitter, or equivalent.

R16—50,000-ohm wire wound potentiometer.
 R17—5000-ohm wire wound potentiometer.
 R18, R20—1.0 megohm, $\frac{1}{2}$ w.
 R19—5.0 megohm, $\frac{1}{2}$ w.
 R21—40,000 ohms, 25-watt, wire wound, adjustable.
 RFC7—2.5 mh., 100 ma., r-f choke.
 RFC8—2.5 mh., 200 ma., r-f choke.
 RFC9—Ohmite Z-1 r-f choke.

the count. Another way of finding the dial points is by listening on the station receiver for the beat note produced by the v.f.o. and the crystal calibrator, but this has its disadvantages. Both v.f.o. dial and receiver must be tuned to each new 10 kc. check point, and the receiver may pick up other signals, making it difficult to determine which is the one wanted, unless the local signal is interrupted or modulated for identification.

The 6BE6 and 6SK7 stages are of course tuned to the Ham bands and can be adjusted by using the beat note from both oscillators or the signal from suitable Ham-band crystals in the crystal socket. Connect a voltmeter across, or a milliammeter in series with, the 6SK7 grid resistor *R13*. Adjust the coil slugs *L2*, *L3*, and *L4* for band coverage and maximum meter reading on each band. Next do the same with the output coils *L5*, *L6*, and *L7*, with a meter in the grid circuit of whatever final amplifier is used. In the author's 6146 final, Fig. 2, the measuring is done at *R16*-*R17*. Measurements are made, of course, with the final filament on and the plate voltage off. The readings will be considerably higher than with the final plate voltage on, up to 5 ma. or 80 to 90 volts, depending upon the grid-circuit resistance of the amplifier used. It is a little easier if two meters are used together, one for each grid circuit. Next, touch up all the adjustments at both ends of the bands, until the tracking is uniform. The L and C of the two resonant circuits is virtually identical, with similar settings of *C13* and *C17* and the tuning slugs of corresponding coils, so it is not difficult to get the circuits tracking evenly. Whatever differences in reactance which are presented by the final grid circuit used are compensated for by adjustment of *C17*, if trimmers *C13* and *C17* are used, or by the tuning slugs of *L5*, *L6*, *L7* if these trimmers are not included in the circuit. If the two trimmers are used, they can be set to spread the 80-meter band the desired number of degrees on the dial, and the tracking can be adjusted more precisely.

The Final Amplifier

The final amplifier, Fig. 2 is conventional except for the addition of a tuning-eye in the grid circuit. With a view to obtaining optimum bias, a variable 50,000 ohm control, *R16*, was inserted as the grid resistor. *R17* also contributes to the bias, but its purpose is to set the negative voltage on the tuning-eye grid. With it the eye can be adjusted to close to a fine line at maximum excitation so that any de-tuning of the exciter output will show as a broader shadow. It works very well and makes a fine substitute for a grid meter. It is cheaper, doesn't wear out with keying, and gives visitors something to look at. It "winks" with keying, of course. A closed circuit jack, *J3*, is provided so a meter

[Continued on page 52]

the crystal's frequency. At zero beat the v.f.o. is exactly on the crystal frequency. A crystal whose harmonic falls within the range will also work similarly. Any such check point makes a good place to start counting off the kilocycles, if a frequency standard or other calibrating device is available. The author used a 1000-100 kc. crystal standard and its 10 kc. multivibrator. Its output was fed into the exciter crystal socket at point "X" on the diagram—a direct connection to the grid of *V1*. The previously mentioned beat notes—at zero beat—provided the dial calibration marks. The beat notes are not loud and the ones marking the 10 kc. points were so faint that a small audio amplifier, instead of earphones, was plugged into *J2*. The 100 kc. points are readily identified by their loudness, so there is little chance of making an error in

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R. C. "DICK" SPENCELEY, KV4AA

Box 403, St. Thomas, Virgin Islands

As the year draws to a close we again salute the efforts of the following stations who, via the expedition or activity route, were instrumental in giving many of us a "new one" for 1954:

Aland Islands: OH2ZE/OHØ, OH2LX/OHØ
(Not separate as yet).

British Somaliland: VQ6LQ (ex-ZD1LQ).

Clipperton Island: F08AJ (WØNWX, WØNUC, WØVDQ).

Cocos Island: TI9AA (DI9AA).

Corsica: F8FW/FC (HB9LA, HE9RDX).

Crete: SVØWK/9 (SVØWK/K6AUU, SVØWL/W6ZID).

Dutch New Guinea: JZØKF (ex-PJØX).

Easter Island: CEØAD.

Fanning Island: VR3D/VR3A (VK2ANB).

Formosa: AB1US (Probably will be acceptable).

Gambia: ZD3BFC (G3BFC, ex-VQ6BFC/MT2BFC).

Heard Island: VK1DY.

Jan Mayen Island: LB8YB.

Jordan: ZC7DO, ZC7BB, ZC7AM.

Kerguelen Islands: FB8XX (ex-FB8ZZ).

Liechtenstein: HB1MX/HE.

Macquarie Island: VK1AC (VK3ACI).

Navassa Island: KC4AB (W4VZQ, W4QCW, WN4HBC).

Norfolk Island: VKØOK (VK2AOK, ZL1AJU), VK9RH.

Qatar: MP4QAH, MP4ABW.

Reunion Island: FR7ZA.

Rio de Oro: EA9DE (EA2CA), EA9DF.

San Andres Island: HKØAI, HK expedition of May 1954.

Sarawak, Brunei, Borneo, Grenada B.W.I.: VS4RO, VS5RO, ZC5RO, VP2GRO (G2RO).

Sarawak: VS4HK (ex-ST2HK).

Tokelau Island: VR2BZ/ZM7.

Arrangements for a visit to VR5RO, Tonga, are pending and, if we know Bob, efforts will be made to put 2RO on the air from any rare spot within walking distance. He will return to England via Australia, Cocos, Mauritius and Africa and will, no doubt, operate from each of these spots for short periods. All QSL's from Bob's Asian tour should be in your hands by Xmas and if any are missing please send another QSL to him, via RSGB, with the word "re-check" prominently displayed.

SVØWK/9, CRETE: A recap on this expedition, Sept. 5 to 8, shows that 471 contacts were made in 58 countries over a 64-hour operating period. First contact was with F8PQ and the last one, 11BPW. First W on both phone and CW was W8PQQ. First in the W districts were: WIHA, W2EGW, W3JNN, W4FU, W5JUF, W6SYG, W9FID and WØAZT. No W7's were heard and a total of 81 W's were worked. European QRM limited stateside contacts. OK1MB deserves a vote of thanks for his efforts towards keeping the frequency clear. 21 Mc. was a "bust" with only 3 contacts being logged. All QSL's should be out.

VQ6LQ, BRITISH SOMALILAND: This station continues his substantial efforts to contact W's with considerable success. His operating times seem to center around 1600 and 2200 GMT daily and in addition 1200 GMT, on Saturdays. QRG is from 14050 to 14072. Charles runs an ET-4336 rig at 300 watts and the receiver is a BC-794. We hear that the rig is some three quarters of a mile from the operating position which "makes" for break-in. W2PRN claims to be his first W contact. VQ6LQ is an operator with Posts and Telegraph in Hargeisa and cards go to Box 11. We hope the QSL's will flow more freely than during his stay at ZD1LQ.

FE8AN, FRENCH CAMEROONS: This station, ex-FE8AN, should be on the air around the first of January according to F9RS. His QTH is: Marcel Veber, Box 408, Douala, Cameroons, F.E.A. Power 50 to 100 watts, CW, with phone later.

At Time of Writing

G2RO/PACIFIC ISLANDS: Thanks to the West Gulf DX Bulletin, G2MI and W4CEN, we are advised that G2RO was due to leave England on or about October 15, for his scheduled tour to the Pacific areas. Bob will go via the U.S.A. and Honolulu.

Presently known stops are as follow:

'R2RO, Fiji Islands: Nov. 4 to 17

'R4RO, Solomon Islands: Nov. 22 to Dec. 7

'R1RO, Gilbert & Ellice Islands: Dec. 30 to Jan. 10

DX Notes

It appears that VQ4HJP has sold all his gear and retired to Mafia Island. This spot is south of Zanzibar and might qualify as a "separate" one. At any rate pressure is being put on him to return on the air with a possible VQØ prefix. . . . Via the West Gulf DX Bulletin we learn that anyone lacking QSL's for HA contacts is invited to write, via registered mail, to Banzegi Ferenc,

Last minute DX items are featured
on page 4

HA7PC, Central Radio Club, Postbox 185, Budapest 4, Hungary. . . . **HS1D** is slated to leave Thailand in February. His next berth will be Pakistan or Spain. . . . **Bari**, **VR2BZ/ZM7**, writes that he had no idea that such importance would have been attached to his Tokelau trip. After reading the **FO8AJ** story he now gets the idea. Great efforts will be made to have a more effective transmitter and receiver along with him for the next trip (which we hope materialized in November). His aim is to dish out QSO's to the many who were disappointed during his first trip. **ZM6AR** was one of the official party, during **VR2BZ/ZM7**'s stay, and he used the station at Nukunono to contact three **ZM6** and one **ZK1** station on 7-Mc. phone using the call of **ZM7AA**. We now hear the call of **ZM7AA** has been officially given **ZM6AR** and we look forward to activity from him in the future. . . . **ZS9I** reporting activity in Bechuanaland, via letter to **W9IOP**, says that **Ted**, ex-**ZS6AHP**, and **XYL** will be heard from in their new QTH of Francistown shortly as **ZS9M** and **ZS9N** respectively. **Jock**, **ZS9A**, runs 25 watts phone on 7 and 3.5 only while **Mac**, **ZS9H**,

also phone, has moved to Lobatsi. **Dave**, **ZS9G**, another phone addict is brushing up his extremely distant acquaintance with the works of Samuel B. Nev. **ZS9I**, should have been heard in the recent contest on all bands from 80 to 15 with 100 watts. . . . A Monaco card to **W5FXN** said: "Sorry no **8A2AY** operation this trip. Got married Tuesday, 73 (sig) **G6LX/3A2AY**. Nuff sed—but don't forget the rig next trip Ron. . . . **G4CP** reports on **ZC7** activities as follow: **ZC7DO** is **QRT** and has left the Army due to poor health. **QSL**'s disappointing. **ZC7BB** should be back in England now. Left to carry on is **ZC7AM**. . . . **Bob**, **W4QCW**, states all **KC4AB** cards to contributors should have been cleared in October. Others will follow via bureaus. **Bob** has been **QRL** college.

From the Southern Calif. Bulletin we hear that the **VK1**'s on **Cocos** are due to pull out in October. Word from Ceylon says that **CR8AB** is real **QRS** even lets **S9** signals go by. **FM7WN** plans vacation in **FG7** and will advise forthcoming dates of operation. **FW8AB** may be heard quite frequently 0300-0600 GMT, 14080. . . . **Pete**, **4S7XG** (**G3HVG**), is now home and passing some time with **G8VG**. . . . Via **FOC-CL** we hear that **VQ4ET**'s trip to Zanzibar, where he appeared as **VQ1DT**, was rewarded by exactly 4 QSO's: **G6ZO**, **ZC4RX**, **VQ2GW** and **OQ5CP**. The trip was made over 1100 miles of "ghastly" roads and ten hours operating time was put in. Lessons learned: A. Take a more powerful rig. B. Take a **VFO**. C. Don't go in July. . . . **Charlie**, well known as **VP9E**, may now be heard as **ZB1CH**. . . . There have been several rumors about **ZC3AC** activity. We hear he skeds **ZS6DW**. . . . **W6AM** tells us about **VK4IC** who operates from **Willis** (not **Wallis**) Island some 300 miles off the Queensland coast. **Willis** has an area of 1086 sq. feet (Good place for a Mini-beam). . . . **KG4AU** departs for a two year stay in **KG6-land**. . . . A further report from **W9FJJ** says that **ZC3AB** (Christmas Island) is on phone, 14150 to 14175 kc. . . . **Finn**, **LB8YB**, is now back in **OX3-land**. . . . **W6CAE** reports activity from **K6IG** on **Chi Chi Jima** (counts same as **Iwo Jima**). . . . **W3GC** reports QSO with **UA0AB** (serving QTH as Moscow). **W3LOE** also nabbed him. Other very doubtfuls were **ZA1FA**, 14060, and **PX1AC**. . . . **F9QV/PC** (Corsica) says he is **QRT** on 14080 each day at 2000 GMT. Good op. . . .



Here is **Ted Beyer** (**SV0WL/W6ZID**) hard at work holding down the CW end of **SV0WK/9** during the recent trip to Crete with **SV0WK**.



This very welcome QSL shows **Bari**, and party, departing for aircraft during **VR2BZ/ZM7**'s September trip to **Nukunono Island** in the **Tokelaus**.



Mel Menges, **KZ5EM**, down Canal Zone way, keeps cool (at times) via his job as refrigeration engineer.

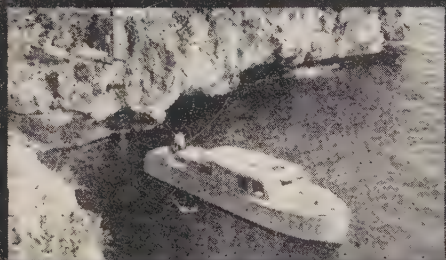
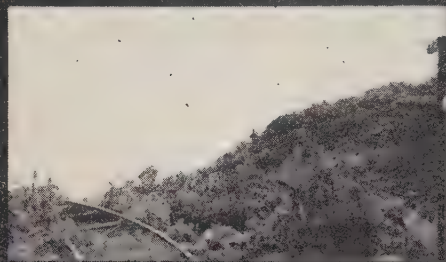


These well known DX'ers, (l. to r.): **W6WB**, **W6TI**, **W6TT**; (sitting) **W6ATO** and **W6DZZ**, will greet you with open arms at the Sixth Annual DX Conference sponsored by the North and South California DX Clubs. This will be held at the Hotel California, Fresno, Calif. January 15 and 16 1955. Other DX Clubs and DX amateurs throughout the world are invited to attend. Further enquiries may be addressed to Conference Chairman **W6TI**, Box 75, Oakland, Calif.

W5UUK reports **FG7XA**, 7006, T7, 0300 GMT. . . . **W6WKE** reports that **VP8BE** (Grahamland, Antarctica), is active on 7025 kc. with 200-watt rig usually between 0400 to 0600 GMT. He leaves next March but a bunch of QSL's will go forward in December. . . . From **F9RS**: In Madagascar **FB8BC**, **FB8BL** and **FB8BN** are active on phone. **FB8RG** and **FB8BN** are active on CW. **FB8BA** is inactive. **FF8JC** returns to **F3EL** in January. **FO8AD** will **QRT** on **Rapa Island** in October (1954), but **FO8AK** will take over.

DX'ploits

Frank, **W6MEK**, went to 248 with the addition of **HK0AI** while **Frank**, **W6SYG**, stayed close behind with **SV0WK/9** for No. 247. . . . **Paul**, **W9NDA**, came up to date with a long list which jumped him from 216 to 244.



A vivid close-up of the August expedition to Navassa Island by Don, W4VZQ, Bob, W4QCW and Carl, WN4HBC. (Photos courtesy of W4RBQ.)
 No. 1: Operating position at KC4AB shows W4QCW at the throttle.
 No. 2: Local spur line of the N.I.R.R. (not used —no commuters!)
 No. 3: Landing spot showing the "famous" iron ladder and boat furnished by the COB gang.
 No. 4: Navassa Light winked calmly on.
 No. 5: Operating shack was well shaded by a Royal Poinciana tree.

30 phone additions upped him to 203 in the "phone only" column. . . . George, VE4RO, upped to 240 with HK0AI. Vic also helped Dewey, W6VE, to No. 228. . . . Bob, W5GEL, back after a DX layoff, adds eleven to rest on 212 while Glenn, W8KIA, pushes to 239 with HK0AI. . . . Van, W9HUZ, eases up to 216 with VQ6LQ, SV0WK/9 and HK0AI. . . . Ev, KP4KD, moves to 207 with LU7ZM (So. Orkneys) and VP8AZ while W3KDP goes to 203 thanks to ZD6BX. . . . Buck, W4RBQ, edges closer to the 200 mark with HK0AI for No. 198 as Joe, W6GPB, hits 197 with help from VS4RO, FB8XX, VK9RH (Norfolk Is.) and HI8WA. . . . Bill, W1HA, ups to 205 with VR3A, SV0WK/9 and ZC7BB while Andy, GM3EST, happily on the way to recovery from a major operation in May, comes up with ZD3BFC for No. 202. . . . Pat, W2GVZ, cracked the 180 barrier with ZD6BX.

Fritz, OE1FF, added zone 39 with FB8BE and nabbed ZS9G for 147. . . . Lou, W1MCW, adds to her imposing phone total with HK0GP, LB8YB, ZD3BFC and SV0WK/9 to reach 216 while Mike, YV5AB, mikes his way to 159 with ten additions. . . . DL7AA moved to WAE/1 with 55 countries and 204 points. . . . DL1YA went to 157 with VP6GT and ZS9I. . . . W2PEO and W3AXT nabbed ZD2DCP on 3505, 0325 GMT. . . . ZD2DCP was also No. 100 for G6ZO on 3.5 Congrats Jim. . . . CO2CT went to 173 thanks to FY7YE and W7AH keyed with VQ6LQ. . . . W0OIS A3'ed with KV4AA on 21 for his No. 11. . . . F9RS, with 50 watts, went to 152 with SV0WK, EL2P and ST2AC. He seeks QSL from KJ7CL, PK5AA, HK4CF, HC1AZ, VP3FJ, VP4CO, VP8BL, AC3SQ, VS9GV, UH8KAA and XZ2EM. . . . Ted, TI2BX, went to 69 when ZS9G and CQ5VP were worked on 21 Mc. His XYL, Ginny, qualified for the Maritime Mobile Certif. by hooking 30/MM's in 90 days. She is now up to 39/MM's with 33 confirmed. . . . W1WAI ups to 84 with such as YO3RD, EA9EB, FY7YC, OD6LC and ST2AR, all 14 CW. . . . 7 Mc activity at DL4ZC brought in ZE6JJ, ZL2FI, PY7QU and PY5VF. On 14 Lloy came up with such as SV0WK/9, VS9AN, VP8AO, LU2ZC, I5PP and FQ8AG. . . . JA8AA was first JA to receive WASM Certificate.

Here and There

From Japan, Takeo, JA1CR, reports that the big signals on 14 CW from each W district are: W1TW, W2WZ, W3CRA, W4CEN, W5UX, W6ZZ, W7AH, W8UPN, W9EU and W0AIH. Most difficult states to work from JA are Del., S.C. and Vt. while the real tough zones are 9, 35, 2 and 40 in that order. Over 2000 licenses have been issued in Japan, but most are of the 2nd class type which only permit activity on 80, 40 and above 6, A3 only. K6DV was issued the first AJD certificate outside of Japan. JA4BB needs two more states to complete WAS while JA1AA's zone and country total leads with a score of 37-134. . . . Dick, W3PZW, now keys from KL7FAF. . . . Irv, W4CGS/ex-W1BTE, was heard keying from HR2AD where he spent some time overhauling equipment damaged in Honduran floods. . . . Our best to W6MEK who was laid low for a spell. Slow is the essence Frank. . . . Tom, TI2TG, now in W6-lan studies to take his General. . . . The KC4AB gang is already considering another DX trex next summer. Any suggestions? . . . Nevada is now in the bag for G2DP who says "Lookout UTAH here I come!" . . . KV4A, logged visits from KH6ABS/KP4, W6NPO and W5LV. . . . Pete, W9JMR, keys from HZ1AB.

G6ZO received visits from PA0UN, HZ1KE and MP4KW. The last mentioned will be back in the middle east soon. . . . Ken, W0YXO, dropped in on W9YFV. . . . PK4DA returns to his former QTH in Sumatra for a two-year stay after which he will come to the U.S.A. for permanent residence. As it is now impossible to get on the air from PK4 nowadays PK4DA has substitute photography for a hobby. Any missing QSL's for past contacts may be applied for via W6UZX. . . . Chas, W1FH, now has neat array of stacked TELREX beams on 21, 23 and 14 Mc. which replace damage done by "Carol." . . . W6LFX is now W4DOWN. . . . Reliable inf states that MP4ABW is no longer in Qatar. . . . W9FII is new Pres. of the W9-DXCC'ers. . . . LZ1KAB sport a new KW rig which is very much in evidence. O Dimiter will be on each Saturday 1400/1900 GMT looking for DX. . . . Wes, SP3AN, has a new call, SP2DX. . . . It is requested that no ZA cards be forwarded to the L bureau for QSP as they cannot help and know of no official ZA stations being on the air. . . . Don, W7LAN, keys from DL4MY in Bamberg while Bob, K2GMO, has received the call of DL4OZ. . . . FF8AJ has moved to Abidjan. See QTH's. . . . Fred, W4KRR, was contacted keying from W6RDF recently. . . . Jack, K2CPR, (ex W3BXE), has 32 countries to show for a year's work on K2. . . . ON4AU seeks QSL's from VP5BF and VP5BH.

[Continued on page 51]

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Southern Europe & North Africa	0730-1300 (3-4)	0600-0730 (2) 0730-1430 (3-4) 1230-1430 (2-3)	1430-1600 (2-3) 1600-1830 (3-4) 1830-0430 (2-3)
Near & Middle East	0730-1030 (1-2)	0630-1200 (2-3)	1630-1800 (2-3) 1800-0600 (2)
Central & South Africa	0830-1300 (1)* 0700-1130 (1-2) 1130-1400 (3)	0630-1330 (1) 1330-1630 (2-3)	1730-0100 (2) 1830-2330 (1-2)
South America	1000-1600 (1)* 0730-1430 (2-3) 1430-1630 (3-4)	0630-1500 (3) 1500-1700 (4-5) 1700-0300 (1-2)	1730-0300 (3-4) 0300-0630 (2-3)
South East Asia	Nil	0700-0900 (1) 1500-1800 (0-1)	0400-0700 (0-1) Nil
Australasia	1600-1800 (1) 0600-0800 (0-1)	0630-0830 (1-2) 0930-1830 (0-1) 1830-1930 (1)	0100-0800 (2-3) 0300-0630 (1-2) 0300-0630 (1)
Guam & Pacific	Nil	0630-1000 (1-2) 1000-1600 (0-1) 1600-1900 (1)	0100-0700 (2-3) 0200-0510 (1-2)
Japan & Far East	Nil	0630-0900 (1) 1900-1800 (1)	0300-0700 (1) 0300-0630 (0-1)

ALL TIMES IN C S T

CENTRAL USA TO:	ALL TIMES IN C S T		
	15 Meters	20 Meters	40 Meters
Western & Central Europe	0800-1030 (1-2)	0600-0730 (1-2) 0730-1130 (3) 1130-1300 (1-2)	1430-1600 (1-2) 1600-1800 (3) 1800-0430 (2)
Southern Europe & North Africa	0730-1200 (2-3)	0600-0730 (1-2) 0730-1200 (3-4) 1200-1400 (2)	1430-1600 (1-2) 1600-1800 (3) 1800-0430 (2)
Central & South Africa	0900-1200 (1)* 0700-1200 (1-2) 1200-1400 (3)	0600-1300 (1) 1300-1530 (2-3)	1700-0000 (2) 1830-2300 (1-2)
Central America & Northern South America	0930-1400 (1-2)* 0930-1400 (1) 1430-1800 (2-3)	0700-0900 (3-4) 0900-1300 (2) 1300-1600 (4) 1700-0230 (1-2)	1600-0500 (4) 0500-0800 (2-3) 1730-0500 (3)
South America	1000-1400 (1)* 0800-1600 (3-4)	0700-0800 (3) 0800-1500 (2) 1500-1700 (4) 1700-0000 (1-2)	1700-0430 (3) 1800-0400 (2)
Japan & Far East	1600-1800 (1)	0700-0900 (1) 1500-1930 (2)	1630-1800 (1) 0200-0510 (1-2)
South East Asia	Nil	0700-0900 (0-1) 1600-1800 (1)	0200-0700 (1) Nil

ALL TIMES IN C S T

CENTRAL USA TO:	ALL TIMES IN C S T			
	15 Meters	20 Meters	40 Meters	60 Meters
Hawaii	1100-1700 (2-3)	1000-1800 (2) 1900-2000 (2-3)	2100-0300 (3-4) 0300-0800 (2)	2200-0630 (3)
Australasia	0600-0730 (0-1) 1500-1830 (2)	0700-1000 (2) 1500-1730 (0-1) 1730-1900 (1)	0100-0700 (3)	0300-0530 (1-2)
WESTERN USA TO:	15 Meters	20 Meters	40 Meters	80 Meters
Europe & North Africa	0700-0930 (0-1)	0630-1000 (2)	1530-0030 (1-2)	1800-2330 (1)
Central & South Africa	0900-1300 (1) 1300-1500 (2)	0600-1300 (1) 1300-1700 (2)	1600-2200 (2-3)	1830-2100 (1)
South America	1000-1330 (1)* 0900-1300 (2-3) 1300-1530 (3-4)	0600-0900 (3) 0900-1400 (1-2) 1400-1730 (4) 1730-0300 (1-2)	1600-0000 (3-4) 0000-0600 (2-3)	1730-0330 (2)
Guam & Mariana Islands	1400-1700 (1-2)* 1200-1800 (3-4)	1030-1200 (2-3) 1200-1800 (1-2) 1800-2000 (2-3)	2330-0730 (3)	0030-0630 (2)
Australasia	1400-1800 (2-3)	0730-1000 (2) 1000-1800 (1) 1800-1930 (2)	0000-0630 (2-3)	0100-0600 (1-2)
Japan, Okinawa & Far East	1400-1800 (2)	1300-1700 (2-3) 1700-1830 (3-4) 1830-1930 (1-2)	2100-0830 (3-4)	2200-0700 (3)
Philippine Islands & East Indies	1500-1730 (2)	1400-1930 (1-2)	0100-0730 (1-2)	0330-0630 (1)
Malaya & South East Asia	1500-1800 (1)	1500-1900 (1-2)	0200-0700 (1-2)	0330-0630 (0-1)
Hong Kong, Macao & Formosa	1500-1700 (2)	1430-1730 (2) 1730-1900 (3)	0000-0730 (3)	0100-0630 (2)

— Symbols For Expected Percentage of Days of Month Path Open:

(0) None (1) 10% (2) 25% (3) 50% (4) 70% (5) 85% or more

* Indicates time of possible ten-meter openings.

The CQ Propagation Charts are based upon a CW radiated power of 150 watts and are centered on Washington, D.C., St. Louis and Sacramento. These forecasts are, for the most part, based upon basic ionospheric data published by the CRPL of the National Bureau of Standards, and are valid until January 15, 1955.



Ionospheric

Propagation Conditions

Forecast by

George Jacobs, W2PAJ

607 Beacon Rd., Silver Springs, Md.

Propagation Conditions - December

- 5 Meters:** A minor peak in v-h-f ionospheric propagation usually occurs during December. Occasional short skip openings are expected, co-incident with auroral and sporadic-E activity.
- 0 Meters:** DX generally poor, with erratic daylight openings expected on a few north-south paths during periods of good propagation conditions. Occasional short skip openings also possible.
- 5 Meters:** Fair or better world-wide DX conditions expected during daylight hours.
- 0 Meters:** Band closing earlier in the day because of shorter hours of daylight in the winter months. Daytime world-wide DX conditions fair to good from shortly after sunrise to shortly after sunset.
- 0 Meters:** With maximum hours of darkness in the Northern Hemisphere during December, band will open for DX quite early. Fair to good DX expected to many areas of the world from a few hours before sunset to a few hours after sunset, with some paths open until shortly after sunrise.
- 0 Meters:** Generally fair or better DX expected to many areas of the world from a few hours after sunset to a few hours before sunrise. When MUF failure causes 40 meters to fade out on a particular circuit, check 80 meters for possible openings on the same path.
- 0 Meters:** Decreased absorption and seasonally lower atmospheric noise levels may permit rather strong signals on some DX paths during the hours of darkness on nights of exceptionally quiet propagation conditions.

This overall picture of band conditions is intended to indicate qualitative changes in each amateur band from month to month. For specific times of band openings for particular circuit refer to the **CQ Propagation Charts** on the opposite page.

Winter Solstice

On December 22, the winter solstice will occur. This is the day on which the sun reaches its most southern point in its travels from northern to southern skies. It is also the day on which the sun is at its nearest distance to the earth. This astronomical phenomena has associated effects on short wave radio propagation. Short wave radio depends upon the ionosphere as its medium of propagation. The ionosphere is created by the ultra-violet radiation of the sun. The more ultra-violet radiation that sweeps across the layers of the ionosphere, the more highly ionized are the layers and the higher are the frequencies that can be used on a particular radio circuit. When the sun is nearest to the earth, as it is during December, intense ultra-violet radiation sweeps across the ionosphere during the hours of daylight. This explains the reason for the seasonally higher daytime frequencies usable in the Northern Hemisphere during the winter months, with the peak reached about the time of the winter solstice. However, the sun is also far in the southern skies during this period, resulting in the maximum hours of darkness occurring in the Northern Hemisphere at the time of the winter solstice. This permits extensive night-time de-ionization of the layers of the ionosphere, considerably lowering usable frequencies. For this reason night-time usable frequencies are at their yearly low on many circuits during December.

During the period of the solstice, and the winter months in general, usable frequencies are seasonally higher dur-

ing the daytime hours and seasonally lower during the night-time hours than during any other season of the year.

Sunspot Cycle

This month's Charts are based upon a predicted smoothed sunspot number of 11, centered on December, 1954. The monthly Zurich sunspot number for September was 1.2, resulting in a provisional Zurich 13 month running smoothed sunspot number of 4.5 centered on March 15, 1954.

Book Review

Over the past few years many readers of this column have taken me up on the offer to answer specific questions concerning radio propagation. Each question received is answered by mail, and beginning this month, those questions that are of general interest will also be discussed in the column. When sending in your questions, please enclose a stamped addressed envelope and allow at least two weeks for a reply.

One of the questions that I am asked most often is to recommend texts on the subject of shortwave radio propagation, especially those that would be most useful for persons just beginning to have an interest in this subject.

Probably one of the finest texts ever written on the subject of practical shortwave propagation is "Shortwave Radio and the Ionosphere" by T. W. Bennington. Mr. Bennington is a member of the Research Department of the British Broadcasting Corporation. The main purpose

Last Minute Predictions

Moderate ionospheric disturbances are expected from December 1-3, 10-11, 21-24 and 27-30. Remainder of month is expected to be normal.

of his book is to present information about shortwave propagation in an essentially simple form, so that it can be of use to those with only a limited technical knowledge of the subject. In this way it is intended to meet the needs of all those "users" of the ionosphere, whether amateur or professional. In the book, the use of mathematics has been avoided, and the physical processes involved explained in clear descriptive language.

The practical side of shortwave propagation is emphasized, and it is shown how scientific ionospheric data may be applied to everyday problems of shortwave transmission and reception. The subject is introduced in such a way as to make it comprehensible to the beginner: The formation and structure of the ionosphere are first discussed, and its effects upon a radio wave are briefly explained. The technique of ionospheric measurement is dealt with, and the nature of the continual variations that occur within the ionosphere are also discussed. The methods for applying the ionospheric information to shortwave transmission and reception are next reviewed at length, and some of the phenomena which particularly affect amateur radio transmission are specifically mentioned. Finally the cause and nature of ionospheric disturbances and of certain other phenomena, such as sporadic E and aurora effects, are also discussed.

All in all, this book is recommended for everyone having an interest in the subject—beginner and professional alike.

"Shortwave Radio and the Ionosphere" is published by Iliffe and Sons, Ltd., London, England and can be obtained through any local book dealer. The price is approximately \$2.50.

Season's Greetings and best wishes to all in 1955. In the new year we can look forward to rising sunspot numbers and improving DX conditions. The long range forecast for 1955 will be discussed in next month's column.

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FT-243

1015	2795	3955	6185	7473.3	7908.3	8325
1110	2815	3980	6200	7475	7910	8330
1129	2825	3990	6206.6	7483.3	7916.7	8333.3
1150	2830	3995	6225	7491.7	7920	8340
1195	2835	4045	6235	7500	7925	8341.7
1525	2840	4095	6240	7506.6	7930	8350
1900	2845	4110	6250	7508.3	7933.3	8358.3
1915	2850	4135	6273.3	7510	7940	8360
1930	2855	4175	6275	7516.7	7941.7	8366.7
1940	2860	4215	6300	7520	7950	8370
1950	2865	4220	6306.6	7525	7958.3	8375
1965	2870	4255	6315	7530	7960	8380
2015	2875	4295	6325	7533.3	7966.7	8383.3
2017	2880	4300	6335	7540	7970	8390
2020	2885	4330	6340	7541.7	7973.3	8391.7
2025	2890	4340	6350	7550	7975	8400
2035	2895	4395	6362	7558.3	7980	8406.6
2040	2900	4445	6373.3	7560	7983.3	8408.3
2055	2905	4450	6375	7566.7	7990	8410
2060	2910	4495	6405	7570	7991.7	8416.7
2065	2915	4535	6406.6	7573.3	8000	8420
2090	2920	4540	6425	7575	8006	8425
2105	2925	4580	6440	7580	8006.6	8430
2125	2930	4610	6450	7583.3	8008.3	8433.3
2130	2935	4620	6473.3	7590	8010	8440
2135	2940	4635	6475	7591.7	8016.7	8441.7
2140	2945	4680	6500	7600	8020	8450
2195	2950	4695	6506.6	7606.6	8025	8458.3
2300	2955	4710	6525	7608.3	8030	8460
2305	2960	4735	6540	7610	8033.3	8466.7
2320	2965	4780	6550	7616.7	8040	8470
2350	2970	4785	6573.3	7620	8041.7	8473.3
2355	2975	4815	6575	7625	8050	8475
2360	2980	4820	6600	7630	8058.3	8480
2365	2985	4840	6606.6	7633.3	8060	8483.3
2370	2990	4845	6625	7640	8066.7	8490
2375	2995	4852	6640	7641.7	8070	8491.7
2390	3005	4880	6650	7650	8073.3	8500
2415	3010	4900	6740	7658.3	8075	8506.6
2430	3015	4930	6773.3	7660	8080	8508.3
2435	3020	4950	6815	7666.7	8083.3	8510
2440	3025	4995	6840	7670	8090	8516.7
2442	3030	5035	6873.3	7673.3	8091.7	8520
2450	3035	5090	6906.6	7675	8100	8525
2455	3040	5127.5	6940	7680	8106.6	8530
2460	3045	5165	6973.3	7683.3	8108.3	8533.3
2465	3050	5180	7000	7690	8110	8540
2470	3055	5235	7006.6	7691.7	8116.7	8541.7
2475	3060	5245	7025	7700	8120	8550
2480	3065	5285	7040	7706.6	8125	8558.3
2485	3070	5295	7050	7708.3	8130	8560
2490	3075	5305	7073.3	7710	8133.3	8566.7
2495	3095	5327.5	7075	7716.7	8140	8570
2505	3100	5335	7100	7720	8141.7	8573.3
2510	3110	5385	7106.6	7725	8150	8575
2515	3130	5397.5	7125	7730	8158.3	8580
2520	3135	5435	7140	7733.3	8160	8583.3
2525	3140	5545	7150	7740	8163.4	8590
2530	3145	5582.5	7160	7741.7	8166.7	8591.7
2535	3150	5587.5	7173.3	7750	8170	8600
2545	3155	5645	7175	7758.3	8173.3	8606.6
2550	3160	5687.5	7200	7760	8175	8608.3
2557	3165	5730	7206.6	7766.7	8180	8610
2560	3170	5760	7225	7770	8183.3	8616.7
2565	3175	5775	7240	7773.3	8190	8620
2570	3200	5780.5	7273.3	7785	8191.7	8625
2575	3202	5800	7275	7780	8200	8630
2580	3205	5820	7300	7783.3	8206.6	8633.3
2585	3210	5825	7306.6	7790	8208.3	8640
2590	3220	5850	7308.3	7791.7	8210	8641.7
2595	3225	5860	7316.7	7800	8216.7	8650
2600	3230	5892.5	7325	7806.6	8220	8658.3
2605	3235	5900	7333.3	7808.3	8225	8660
2660	3240	5907.5	7340	7810	8230	8666.7
2665	3250	5925	7341.7	7816.7	8233.3	8670
2670	3300	5955	7350	7820	8240	8673.3
2675	3310	5975	7358.3	7825	8241.7	8676
2680	3320	5995	7366.7	7830	8250	8680
2685	3340	6000	7373.3	7833.3	8258.3	8683.3
2690	3410	6006.6	7375	7840	8260	8690
2695	3420	6025	7383.3	7841.7	8266.7	8691.7
2705	3455	6040	7391.7	7850	8270	8700
2710	3465	6042	7400	7858.3	8273.3	8706.6
2715	3500	6050	7406	7860	8275	8708.3
2720	3510	6073.3	7406.6	7866.7	8280	8710
2750	3525	6075	7408.3	7870	8283.3	8716.7
2755	3640	6100	7416.7	7873.3	8290	8720
2760	3655	6106.6	7425	7875	8291.7	8725

FT-243 Cont'd

2765	3680	6125	7433.3	7880	8300	8730
2770	3700	6140	7440	7883.3	8306.6	8733.3
2775	3760	6142	7441.7	7890	8308.3	8740
2780	3800	6150	7450	7891.7	8310	8741.7
2785	3885	6173.3	7458.3	7900	8316.7	8750
2790	3940	6175	7466.7	7906.6	8320	

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YOUR CHOICE OF FREQUENCIES!	
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DOUBLING TO 40 METERS:	3588, 3589, 3590 through 3598 in steps of 1 KC.
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	Individually. Each. 99c
400	446 453 459 466 474
440	447 454 461 468 475
441	448 455 462 469 476
442	450 456 463 470 477
444	451 457 464 472 478
445	452 458 465 473 480

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327.8 KC. No. D-168342. (Used in TS-102/AP) 9.95	2738 KC. MC-7. 2.95
500 KC. FT-241 1.99	2891 KC. DC-34. 2.95
1000 KC. Type DC-9, in octal tube base type holder 3.45	2907 KC. DC-34. 2.95
2000 KC. FT-243. 1.99	2951 KC. DC-34. 2.95
2009 KC. DC-34. 2.99	2973 KC. DC-34. 2.95
2140 KC. DC-34. 2.99	2977 KC. DC-34. 2.95
2126 KC. DC-34. 2.99	2983 KC. DC-34. 2.95
2142 KC. DC-34. 2.99	3000 KC. FT-243. 1.95
2166 KC. DC-34. 2.99	3021 KC. DC-34. 2.95
2174 KC. DC-34. 2.99	3023 KC. DC-34. 2.95
2182 KC. DC-34. 2.99	3043 KC. DC-34. 2.95
2182 KC. FT-243. 2.99	3053 KC. DC-34. 2.95
2206 KC. DC-34. 2.99	3055 KC. DC-34. 2.95
2500 KC. FT-243. 1.99	3088 KC. FT-243. 2.95
2559 KC. DC-34. 2.99	3093 KC. DC-34. 2.95
2567 KC. DC-34. 2.99	3093 KC. FT-243. 2.95
2629 KC. DC-34. 2.99	3103 KC. FT-243. 2.95
2632 KC. FT-243. 2.99	3123 KC. DC-34. 2.95
2637 KC. DC-34. 2.99	3125 KC. DC-34. 2.95
2637 KC. FT-243. 2.99	3188 KC. FT-243. 2.95
2638 KC. DC-34. 2.99	3193 KC. DC-34. 2.95
2638 KC. FT-243. 2.99	3193 KC. FT-243. 2.95
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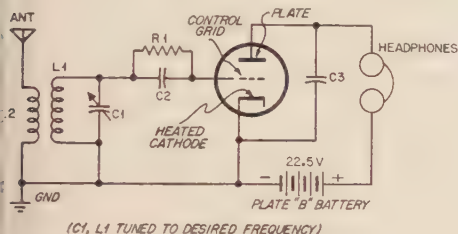


Conducted by

HERBERT "HERB" S. BRIER, W9EGQ

385 Johnson Street, Gary 3, Indiana

Last month, we concluded our discussion of electron tubes with diode detectors. The big disadvantage of such detectors is that their output power is no greater than the power delivered to them by the receiving antenna. As it requires a milliwatt (.001 watts) of audio power in a pair of phones to produce a usable signal, and a 100-microvolt signal at the antenna terminals of an amateur communications receiver is considered a strong signal,* a diode detector requires a tremendous signal to be useful.



(A) BASIC GRID LEAK DETECTOR

Fig. 1(A). The basic grid-leak detector circuit. This circuit is almost never seen in modern receivers because of the very low efficiency.

receiver is considered a strong signal,* a diode detector requires a tremendous signal to be useful.

The Triode Vacuum Tube

DeForest provided the tool for building more sensitive radio receivers, as well as thousands of other electronic devices, when he added a grid of fine wires between the plate and the cathode of a diode, transforming it into a three-element or triode tube.

The function of the new element in the triode, called the control grid, is found by applying a fixed voltage to the plate of the tube and measuring the plate current while varying the grid voltage, then holding the grid voltage constant while varying the plate voltage. It will be discovered that a small change in grid voltage has as much effect on plate current as does a large change in plate voltage.

Why the control grid has so much control over the plate current in a triode is simply a matter of distance. It is closer to the cathode than is the plate; therefore, it controls the electrons emitted by the cathode with a smaller stick than the plate must use. The nice thing about the whole thing is that the grid seldom expends any energy in exercising its powers of control.

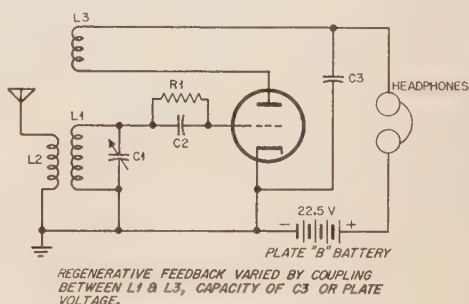
This interesting condition is achieved by operating the control grid with a fixed, negative bias on it and limiting the peak signal voltage to a value that does

Several modern communications receivers have "S" meters calibrated to indicate S9 when a 100-microvolt signal is presented to their antenna terminals. Assuming a 300-ohm input impedance, a 100-microvolt signal represents approximately 0.0000000003 watts of signal power.

not exceed the bias voltage. In this manner, the grid does not draw current during any part of the excitation cycle; therefore, it does not consume power in controlling appreciable amounts of plate-circuit power.

In some applications, the grid may be driven somewhat positive. Even then, it consumes comparatively little power, because relatively few electrons actually strike the grid wires. The rest flow between them to the plate, as long as there is a higher positive voltage on the plate.

The ratio between the grid and the plate voltages



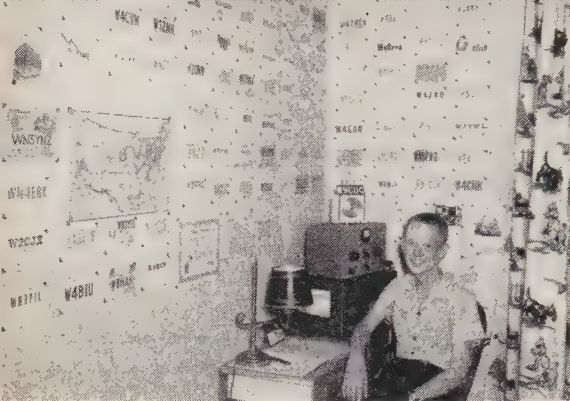
(B) REGENERATIVE GRID LEAK DETECTOR

Fig. 1(B). This is the popular regenerative circuit which feeds a part of the plate signal back into the grid circuit to obtain additional amplification.

required to produce a given (small) change in the plate current of a triode is called its amplification factor or μ . The μ of modern triodes runs between about 2 and 100. As the factors which increase the μ of a tube also decrease its plate current, a high- μ tube is used when high amplification of signals is required, and a low- μ tube is used when power output is more important than high amplification. A μ of about 20 is average for a general-purpose triode.

Richard Carty (15) K6CYT, Pomona, Calif., just after receiving his general class license. Best DX worked as a Novice was Maine.





Mickey Manor (15), WN9CUC, Muncie, Indiana, operates on the 3.7 and 7.2-Mc. Novice bands and has worked 38 states and Canada. His smile will be even bigger when one of the California stations he has worked sends him a card.

The Triode Detector

The first use of a triode tube was as a detector. Figure 1 shows several typical circuits. In Fig. 1A, the grid and cathode form a diode detector, with $R1$ and $C2$ acting as the load resistor and filter capacitor. $C2$ also serves to bypass the incoming signal around $R1$. The rectified signal currents flowing through the resistor develops a voltage across it, which applies a negative voltage to the grid. This voltage then varies with the modulation on the signal, causing a corresponding variation in the plate current. The varying current flowing through the phones produces an audible output signal which is ten to twenty times as loud as the same input signal would produce from a diode detector.

Besides the audio-frequency signal, the radio-frequency signal also appears in the plate circuit of the detector. However, its frequency is too high to be audible, and the capacitor $C3$ bypasses it around the phones to ground. Later, it was discovered that by feeding back part of this radio-frequency signal to the grid circuit of the tube; so that it travelled through the tube again in step with the original signal, far louder signals were delivered from the phones.

Figure 1B shows this feedback obtained by means of inductive coupling between the plate and grid circuits. In other circuit arrangements, it can be obtained through capacitive coupling with the same end results.

The above process is called *regeneration*. If carried beyond a certain critical point, the energy fed back from the plate to the grid circuits will become sufficient to overcome all circuit losses, and the tube will break into sustained *oscillations*. When this happens, the tube is converting part of the direct-current energy supplied to it by its power supply into alternating current, without the aid of an incoming signal. The frequency of oscillation is determined almost entirely by the resonant frequency of $L1$ and $C1$.

Oscillators are extremely important in their own right, and I shall come back to them later. For the present, I shall continue discussing detectors.

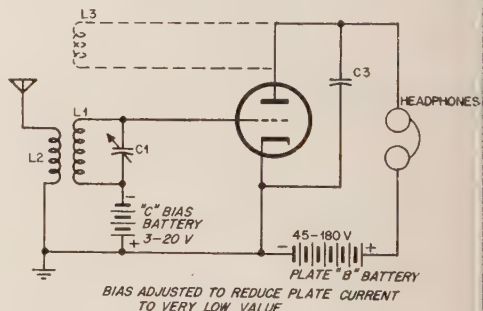
Greatest sensitivity in receiving modulated signals with a regenerative detector is obtained with the regeneration adjusted to just below the oscillation point. When the detector actually oscillates, a whistle is heard in the phones every time a signal is tuned in. Under these conditions, the signal generated by

the detector itself *beats* or *heterodynes* with the coming signal to produce a third signal, the frequency of which is the difference between the frequencies of the other two.* Thus, by tuning the detector to a slightly different frequency than that of the incoming signal, an audio *beat note* is heard in the phones.

In the above manner code signals, which are modulated only to the extent of being broken into dots and dashes, can be received with a generative detector. It is important that the detector not be allowed to oscillate too vigorously; otherwise, the signal generated in the tube itself will swamp out the incoming signal.

The detectors of Figs. 1A and 1B are called *grid-leak* detectors. They are sensitive to weak signals but overload easily on strong ones. This follows because the negative voltage produced on the grid by the rectified incoming signal reduces the tube plate current. Sufficiently strong signals will cut off the plate current completely, resulting in highly distorted output.

Figure 1C is the circuit of a *biased* or *plate-circuit* detector. It is less sensitive than the grid-leak type but it will handle strong signals without overloading. It works in the following manner: The fixed grid bias reduces the plate current to practically zero. Therefore, when a signal is tuned in, the plate current increases on the positive half cycles of the signal, but it cannot decrease appreciably on the negative half cycles, because it is virtually zero



(C) BIASED DETECTOR

- | | |
|--|------------------------------|
| $C1$ - TUNING CONDENSER | $L1$ - TUNING COIL |
| $C2$ - GRID COND. (100-250 $\mu\text{f/d}$) | $L2$ - ANTENNA COIL |
| $C3$ - BYPASS COND. (.001-.002 $\mu\text{f/d}$) | $L3$ - FEEDBACK COIL |
| | $R1$ - GRID RESISTOR (2 MEG) |

Fig. 1(C). The bias detector (sometimes called the plate detector) will handle greater signal voltage than the circuit shown in Fig. 1(A).

ready. As a result, the average plate current increases with signal. The modulation on the signal then varies this current, as already described, to produce a signal in the phones.

The Triode Audio Amplifier

While the sensitivity of a regenerative detector is far greater than that of a diode detector, its output is still far from ear-splitting. So, with a few magic passes, we convert another triode into an audio-frequency amplifier. Figure 2 shows the circuit.

In the circuit, the primary of the audio-frequency transformer replaces the phones in Fig. 1, and the audio-frequency signal flowing through it induces a replica of the signal into the transformer secondary winding. From there, the signal goes, via the volume control, to the grid of the tube, to be amplified before being delivered to the phones.

Obviously, the most important requirement of an

* The heterodyning action will also produce a signal that is the sum of the original frequencies, but we need not concern ourselves with it at this time.

an amplifier is that its output signal should be an amplified replica of the input signal. Adjusting the grid bias voltage; so that the tube is operated on the most linear portion of its grid-voltage, plate-current curve helps achieve this goal.

As the input signal causes the tube plate current to vary above and below its no-signal value, the current remains constant, with or without signal, as long as the input signal is not excessive or highly nonsymmetrical. A tube operated in the above manner is called a Class A amplifier.

Referring again to Fig. 2, when the alternate resistance-coupled input circuit is used, the audio signal currents flowing through the input resistor produces an audio-frequency voltage across the resistor. This voltage is coupled, via C1, to the grid circuit of the amplifier, from which point the action is as already described.

Transformer coupling is normally used in audio amplifiers when the grid (or other load) circuit draws power, impedances must be matched, or it is necessary

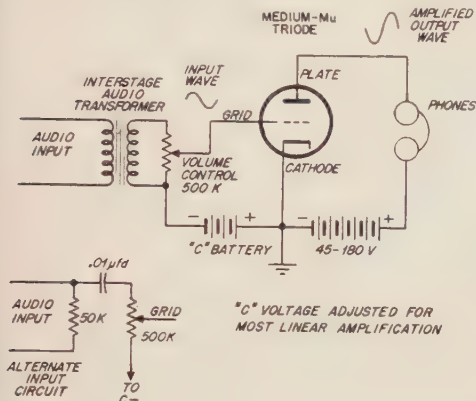


Fig. 2. Basic class A triode audio amplifier. When its input circuit is substituted for the phones in Fig. 1, the circuit of the standard amateur receiver for many years is formed.

to keep d-c resistances to a minimum; otherwise, resistance coupling is used, because of its much lower cost.

The circuit of Fig. 1B, combined with that of Fig. 2, produces what was the standard amateur receiver for many years. Considering its simplicity, it is still an efficient code receiver in the 3.5-Mc. and 7-Mc. bands, although it does not compare in effectiveness with modern, multi-tube, communications receivers. It is easily "blocked" by strong local signals and is neither very selective nor extremely sensitive.

In our next discussion of vacuum tubes, we shall learn of some of their other uses in amateur equipment and how additional elements have increased their versatility.

News For And About Novices

Lee, W6MNN, writes from north of the 38th parallel, Korea; "After reading about EL2X hearing Novices in Liberia, it occurred to me that some of the boys would like to know they are getting into Korea. Unfortunately, I have not kept a record of calls, and the only one I recall off-hand is KN6ELZ, whom I have heard several times with strengths up to S7 on 7 Mc. I hope he is as thrilled to hear this as I would have been when I was on the air in the States to hear that I was being heard so far away. I'll drop you a line from time to time, to let you know of other WN's I may hear."

Bob Rose, KN6GKU, 6128 Temple City Blvd., Temple City, Calif., reports; "I have found that Ham radio is about it when it comes to fun and friends. We have four Hams on one block—two Generals and two Novices. W6FHN, who started me in this game, is my chief competitor. He is running 100 watts to a vertical antenna not 300 feet from my antenna, also a vertical, which I drive with 35 watts to an AT-1 transmitter. Well, it's rough, but we are the best of friends, and I would not have anybody else there, hi."

"I haven't set any DX records, but I have worked the Atlantic Seaboard. My li'l vertical will skip in anywhere; so I will be glad to sked anyone who needs California."

Doug Conrad, VE1UY, 163 Carmarthen St., St. John, N.B., Canada, says; "I wouldn't miss reading the Novice Shack at all to find out what other fellows about my age (17) are doing with their rigs. . . . I run about 30 watts to a doublet antenna, and I use an S-38B receiver. In two months on the air, I have worked Maine and four Canadian Provinces. I shall be glad to help

any interested person in or around St. John to obtain his amateur license."

Kim Keller, WN4HYQ, P.O. Box 167, Albertville, Ala., reports; "I am 13 years old and have had my ticket for a little over a month. My transmitter is a 6AG7-6L6 running about 30 watts, and my antenna is a grounded Marconi. I have had about 50 QSO's in 13 states. Best DX has been about 1100 miles. Anyone need a QSL from Alabama?"

Claude Sauvain, WN5GAQ, 5808 West 8th St., Tulsa, Okla., says; "I have a TBS-50D transmitter and an S-76 receiver. I have worked 15 states, but I have about five QSL cards all filled out in the 'dead QSL file,' because I don't have addresses for them. I'll be glad to sked anyone needing Oklahoma."

John Hudick, WN2ZJU, 440 Owen St., Swoyerville, Pa., reports, "Some guys think they have trouble. They should hear about mine! After building my transmitter five times, lo and behold! It worked. I was ready to throw it out the window four times. After I finally got it working, I made my first contact with a YL, KN2ICX, but then I lost her in the QRM. My rig is a 6L6, with about 10 watts input, my antenna is a Zepp, and my receiver is an S-38C."

The writers of the next two letters should get together. Bill Butler, KN2IYO, 123 Sherron Ave., Salem, N. J., says; "In two months I have had 30 contacts in eight states, running three watts and using an S-38 receiver. I would like to form a club among Novices and Generals who run less than ten watts input."

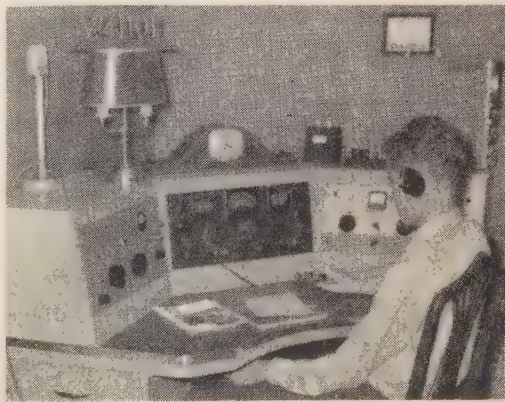
F. Allan Herridge, G3IDG, 95, Ramsden Road, Balham, London, S.W. 12, England, writes; "I'm not a Novice but I do read your pages in CQ each month. From the pictures you print, lots of Novices over there use simple equipment and low power. I am a great believer in both and have never run over ten watts input on any band in my three years on the air."

"I don't know if any of your readers would be interested, but we have here a QRP Society which encourages the use of low power. It is suggested that overseas Hams confine themselves to 20 watts input. U.K. Hams to use a maximum of five watts input, except when contact is being established, at which time a maximum of 20 watts may be used. The Society publishes a monthly magazine. At present there are three "W" members—W2EQS, W2QHH, and W0PRM. No Novices you notice, but no doubt many of them could qualify for the Society and might be interested in it. Full information can be obtained from: John Whitehead, The Retreat, 92 Rydens Ave., Walton-on-Thames, Surrey, England."

Harry Sherman, WN8SUA, R. #1, Box 114, Lansing, Mich., writes; "I am 47 years old and have had my license for about six weeks. I have had 129 QSO's in ten states, using a Heathkit AT-1 transmitter and an S-38 receiver. This has been on 3.7 Mc. Next week, I am going to try 7.2 Mc."

Fred R. Herr, W3WPV, 911 Old Manoa Road, Haver-town, Pa., says; "I am writing this as a Novice, but I am waiting for my General ticket, as I recently passed the examination. During my spell as a Novice, I have worked 13 states, all in a general NE-SW direction from here. Best DX has been WN4GMR, Miami, Fla. . . . My transmitter is home-made. It operates at a pressure of ten watts, and it surely covers the land. Receiver

[Continued on page 58]



Ex-Novice Jim Morrell, W4DQI, Arlington, Virginia. The operating console is modelled after the one in the local MARS station.

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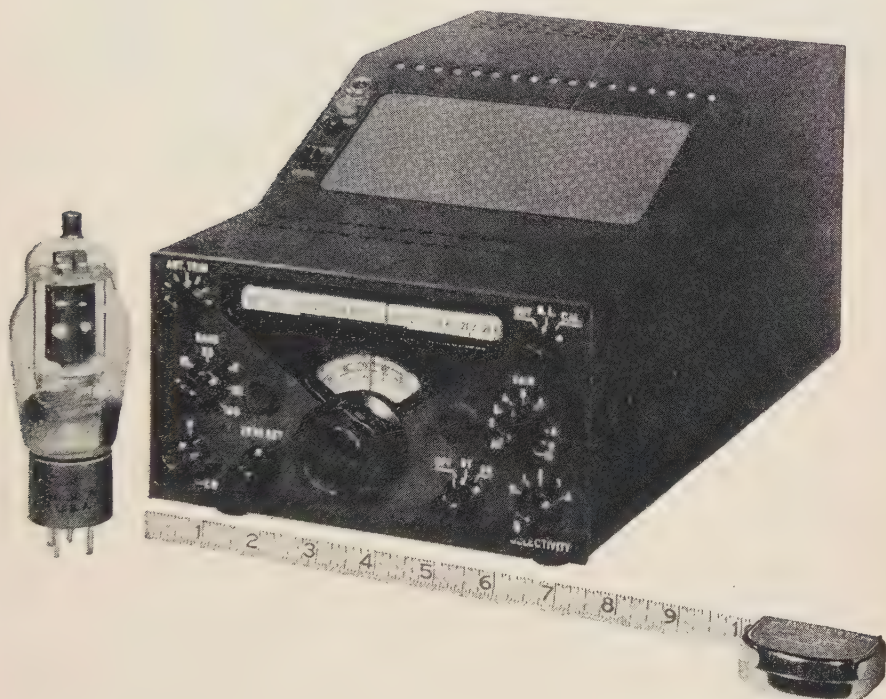


the

CQ

Mobile Feature

Ultimate



Mobile Receiver

R. A. Eidemiller, WØMWD

The last page of the "Radio Amateurs' Mobile Handbook" (1953) contained an intriguing photograph which many readers mistook to be a commercial mobile version of a popular Ham receiver. Instead it was a Ham-built superb piece of equipment. Upon closer examination the Editors of CQ were surprised to find that they could not adequately describe this receiver so that it might be reproduced by those readers possessing ability and facilities to do so. In its place, and because of the wide interest it has aroused, we are pleased to at least present this "photo story."—Editor.

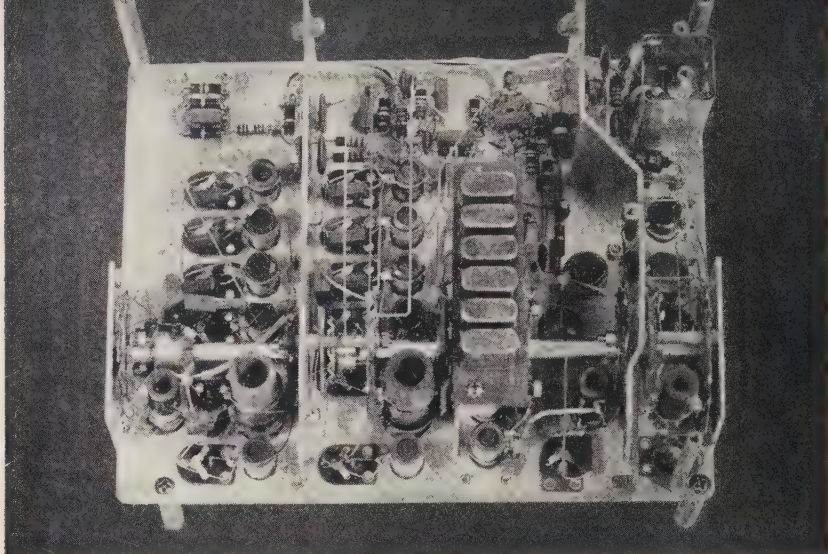
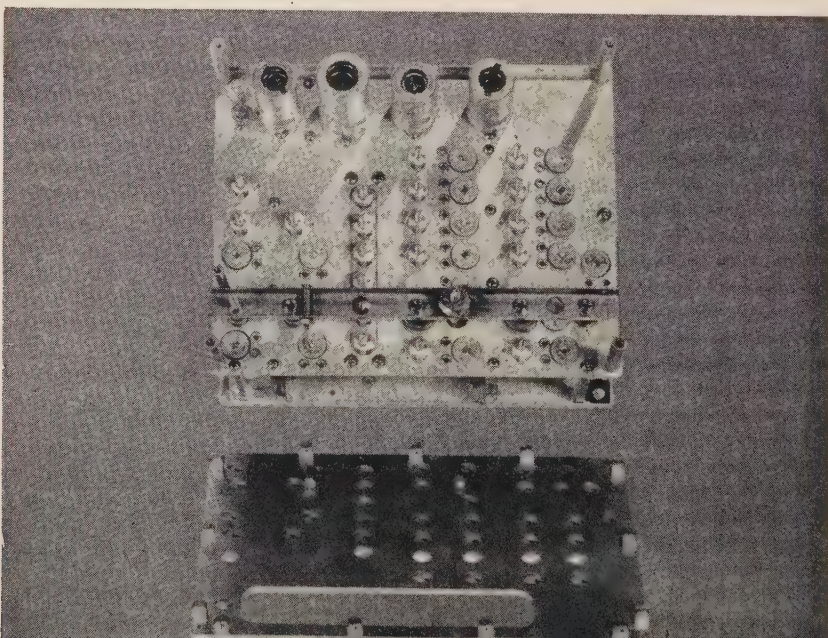


Fig. 1. View of the r-f assembly showing wiring and all crystals installed.

Fig. 2. The adjustment end of the coils and condensers in the r-f chassis are shown in this view. The rear plate shows the various holes and cutouts made to allow access for alignment tools. This photograph was taken before the gear train was installed on the rear plate.



It all started a few years ago during one of those typical Ham bull sessions. It was generally conceded that the main receiving problem had now shifted from one of sensitivity at the higher frequencies to one of selectivity at the lower frequencies. Of course, one must still have a fairly sensitive receiver, but laments were loud and long about some joker 15 or 20 kc. away covering up a fixed station just after the mobile had yelled his lungs out to set up the contact. Usually this S9-plus signal didn't bother the mobile signal at the fixed station—he had a *selective* receiver, but it certainly ruined mobile reception in a large chunk of the band.

As the discussion waxed hot and heavy, someone summed up the perfect specifications for a mobile receiver. It must have 5 kc. selectivity, 2 μ v. sensitivity, calibrated bandwidth, no drift, dual conversion, built-in BFO, noise limiter, crystal filter, S-meter . . . and so on.

After the session broke up, nothing much was thought about this mobile hallucination until some time later when in sorting out the usual accumulation of Ham junk in the desk drawer, we ran across the specification list that was written down during the bull session.

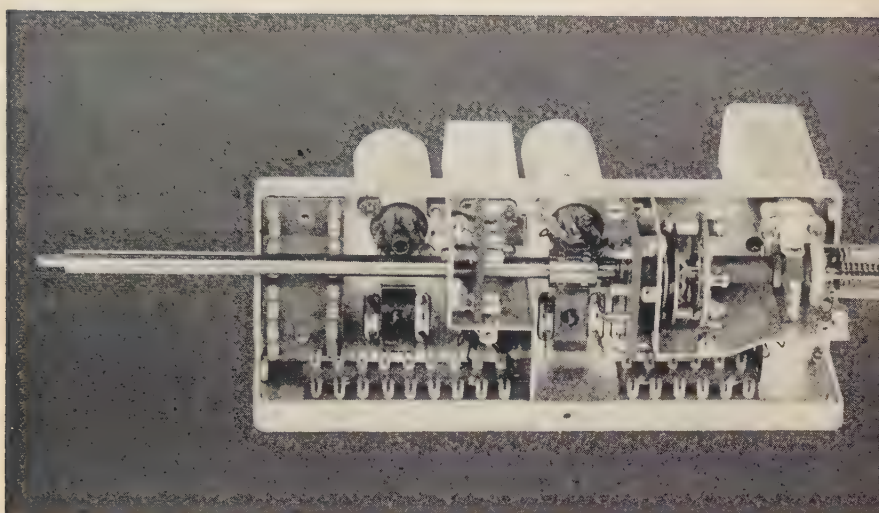
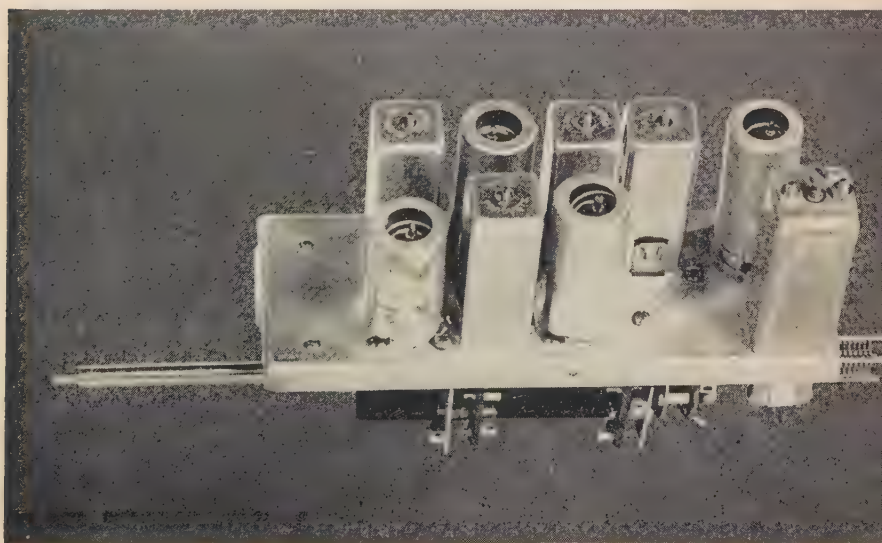


Fig. 3. Bottom view of the i-f chassis before wiring. The crystal filter unit and shield is shown in the upper right corner.

Fig. 4. Top view of the i-f chassis. The space at the right is for later installation of a Collins mechanical filter.



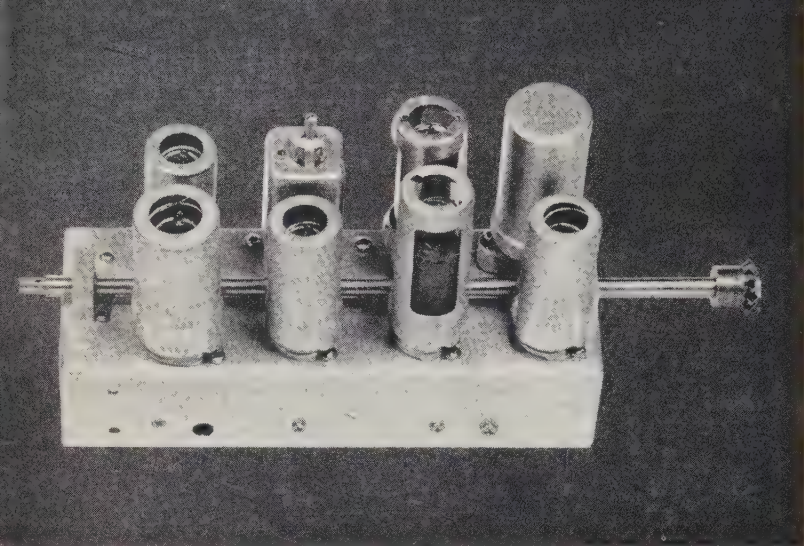


Fig. 5. View of the chassis. The bandswitch is shown in position.

It suddenly dawned on us that this specific receiver (in a larger version, to be sure) was sitting upon the operating table: The *Collins 75A2*! True, it was gargantuan as compared with what could be permitted in a mobile installation, but didn't it possess or exceed all the desired characteristics of the ideal mobile receiver? Couldn't it be shrunk?

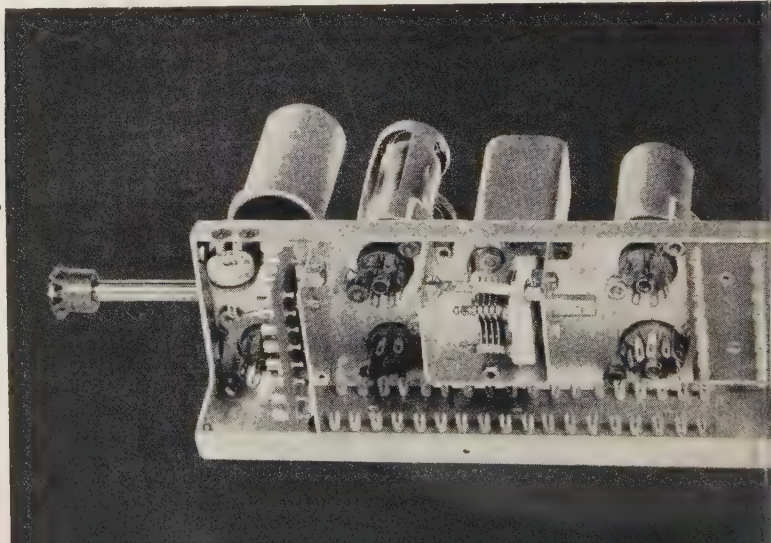
Forthwith the cleaning project was abandoned and the receiver was removed from its cabinet. Here started what was to be the first of many an hour of probing the innards, measuring, noodle scratchin', and sketching. Initially, the idea had been to dismantle the *75A-2* and use most of the parts in a smaller version. This idea was given up as impractical, since many of the parts in the '*A-2*' were just too big. However, most of these large components are duplicated in a miniature line by various manufacturers, and the use of these miniaturized components permitted a satisfactory shrinking job to be done on the receiver. The electrical circuit of the '*A-2*' was duplicated, with the exception of the power supply, and the c-w noise limiter.

General Physical Layout

After considerable juggling of parts, the shrinking job finally boiled down the receiver proper into three main chassis assemblies:

1. The r-f unit with its 3 chassis plates, slug rack, bandswitch, coils, crystals, etc. (Figs. 1 and 2).
2. The i-f chassis with its i-f transformers, crystal filter and detector. (Figs. 3 and 4).
3. The audio chassis, which has the audio stages, b.f.o., 100-kc. calibrator and noise limiter, (Figs. 5 and 6).

Fig. 6. Bottom view of the unwired audio chassis. The variable condenser is for b-f-o pitch. The ceramic trimmer is for 100-kc. calibrator adjustment from outside the cabinet.



These three chassis are assembled, separately, and then combined into one unit, as shown in Figs. 7 and 8. The speaker and output transformer are mounted on the top lid of the cabinet and the "S" meter is mounted in a special clamp that may be attached to the steering column of the car.

The R-F Unit

The r-f unit utilizes the 75A-2 coils, and special *Oak* miniature type *F* wafer switches. The axis of the *Oak* bandswitch is parallel to the front panel of the receiver, and a right-angle drive must be used between the switch assembly and the bandswitch shaft. A special gear reduction is mounted on the mounting plate of the *PTO* unit to provide correct tuning speed for the movable slug rack. This slug rack, as well as the *PTO* unit is tuned by the main tuning dial of the receiver. The r-f section of the receiver is approximately $7\frac{1}{2}$ "x6"x5" in size. The tube lineup is 6CB6 r.f., 6BE6 mixer, 12AT7 h-f xtal osc., and 6BE6 2nd mixer.

The I-F Unit

This section of the receiver is link coupled to the 6BE6 2nd mixer, and contains the crystal filter, three 6BA6 i-f stages, 6AL5 detector and a.v.c. and the S-meter circuit. It is located to the right of the 70E-12 *PTO* and measures about $6\frac{1}{2}$ "x2 $\frac{3}{4}$ "x1 $\frac{1}{2}$ ", exclusive of tubes. Special high "Q" i-f transformers are used to obtain communication selectivity. The crystal switch and phasing control (Fig. 3) shafts are concentric, with the center phasing shaft running through the switch to the phasing control at the rear of the chassis. Terminal boards are used to mount the resistors and condensers where practical.

The Audio Unit

The audio chassis is on the left side of the receiver, directly opposite the i-f chassis. The bandswitch drive shaft and antenna trimmer shaft run down the center of the chassis between the tubes (Fig. 5). On this chassis are: The 6BA6 beat frequency oscillator, 12AX7 a.v.c. and audio stage, 12AL5 noise limiter and 6AQ5 output tube. In the rear chassis corners are the 100-kc. crystal and the 6BA6 oscillator tube. The audio chassis is about $6\frac{1}{2}$ "x1 $\frac{1}{2}$ "x $\frac{1}{2}$ " in size. A small shield encloses the b-f-o tuning condenser. As on the i-f chassis, all small resistors and condensers are mounted on terminal boards which are wired before installation.

The Master Oscillator

The 70E-12 oscillator is mounted between the i-f chassis and the audio chassis. A 3-gear train drives the slug rack shaft and the dial pointer gear. The oscillator and sub-chassis are mounted to a sub-panel, mounted about $\frac{1}{4}$ " behind the main panel. The dial drive mechanism is mounted in this space, along with the dial lamps and various panel controls.

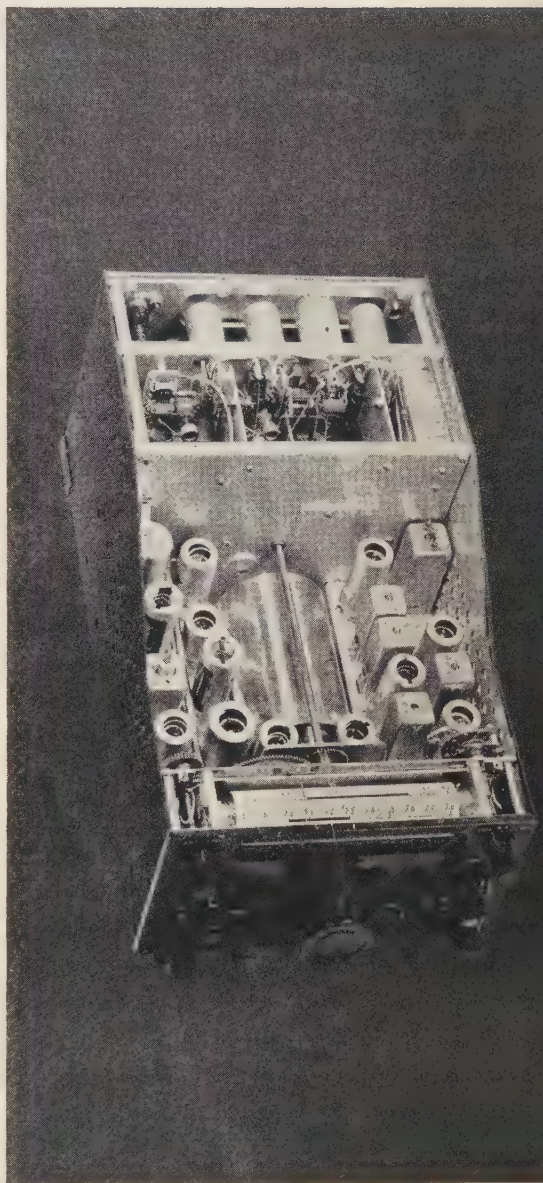


Fig. 7. Top view of the completed receiver.

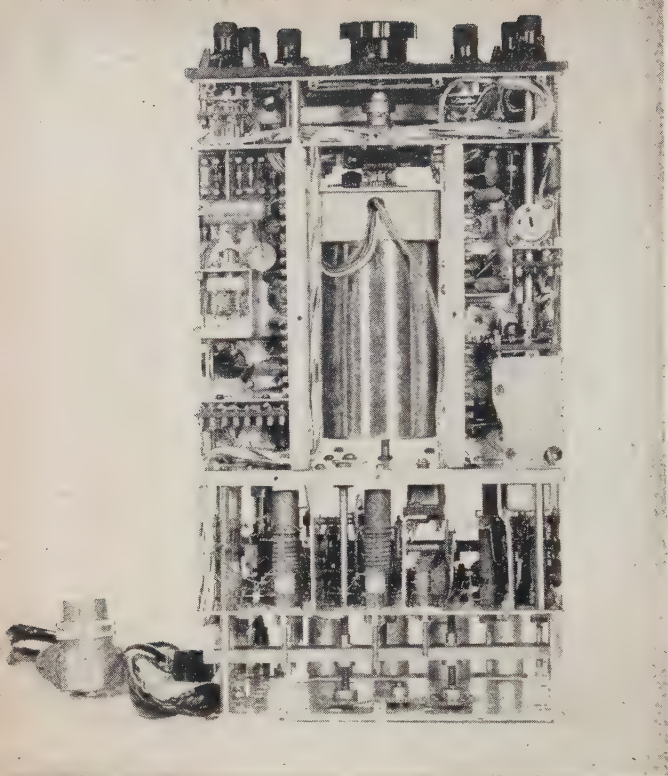


Fig. 8. Bottom view of the wired receiver. Note the gear train and extra slug rack lead screw drive. For the uninitiated, the "can" in the center is a Collins 70E-12 PTO.

General Assembly

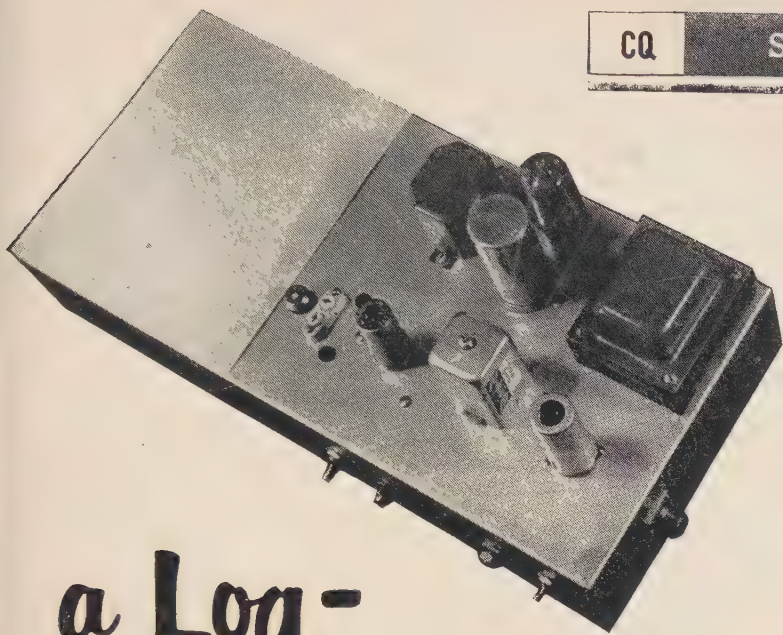
The front panel is made of laminated lucite, with engraved letters and numerals. It is edge lighted by "grain of wheat" lamps, so that the engraved letters are illuminated at night. A special miniature drum dial and kilocycle dial were made to fit the available panel space. As in the 75A-2, the scales are color coded, and a fiduciary control is provided to set the line on the kilocycle scale for accurate frequency readings. The megacycle pointer is driven by a dial cable from the drum mounted behind the support panel.

The small knobs on the front panel were turned from solid aluminum stock. The large knobs were made from brass and the "wings" soldered on after the knobs were turned on a lathe.

The receiver cabinet is nothing more than a wrap-around with ventilation holes drilled in it. Large cut-outs in the bottom give access to the underside of the receiver. Plates cover the cut-outs when not in use. The top of the cabinet holds the speaker, output transformer, phone jack, and local-remote switch. The receiver is mounted in the car by a rear bracket to the firewall, and angle brackets under the dash. The separate power supply can be mounted anywhere convenient. A separate a-c operated supply has also been made for normal Ham shack use of the receiver.

Performance

When the receiver was completed and aligned, it provided a 10-db. signal/noise ratio with a 2 μ v. or less signal on all bands, and had a pass-band of 5 kc. at 6 db. down, 17 kc. at 60 db down. The receiver performs very well in a car, and does not drift or change frequency when the car generating system is turned on and off. It is a new sensation to be riding along listening to the SSB boys and their relatively QRM-free channels, or to be able to tell your contact his frequency and be sure of it! We had to get used to the luxury of the crystal filter in fighting the ever-present QRM, and the master oscillator is "tops" for reset accuracy when checking signals on any of the 7 bands. All in all, it has been a very rewarding construction experience, and the months of work inherent in the construction of such a receiver are more than repaid by its splendid performance.



Above chassis view of the log-linear amplifier and detector. The blank space at the end of the chassis provides working room with testing a new filter.

a Log-Linear Detector

Jack N. Brown, W3SHY

Contributing Editor

In his book "Single Sideband Techniques" (just released) the author describes a very low rate sweep generator. (The "Ferri-Sweeper") It is a basic requirement to properly align many types of SSB filters. Another useful device in this work is a log-linear detector and amplifier. —Editor.

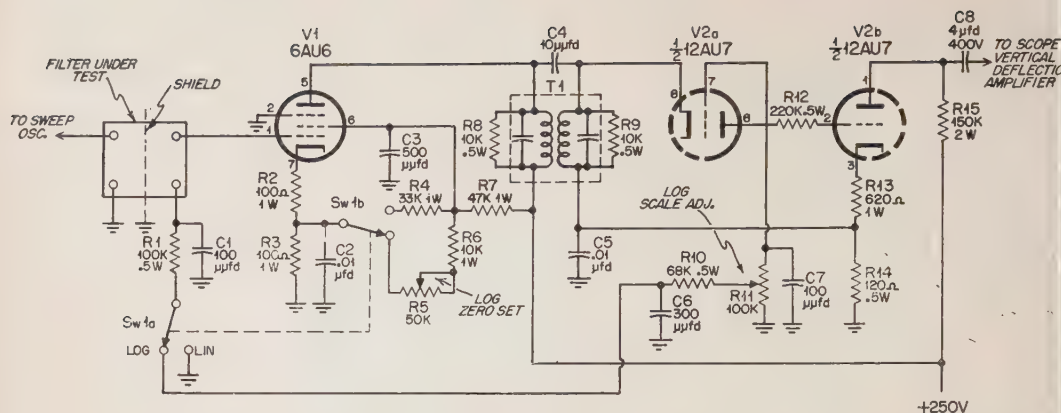
This device is nothing more than a class A i-f amplifier with a very broadly tuned transformer in its plate circuit feeding an a-v-c detector. This detector is also the video detector for the oscilloscope presentation. The application of the a-v-c voltage on the control grid of the amplifier stage following the filter will result in a response that is a fair approach to a logarithmic amplitude response in the final oscilloscope picture. The time constant of the a-v-c circuit must be quite short in order to follow the rapidly changing filter response as the oscillator signal is swept through the filter passband.

Circuitry and Theory of Operation

Figure 1 shows the schematic of the "Log-Linear Amplifier." Tube *V1*, is a remote cutoff pentode that is used in many broadcast sets. Switch, *Sw1*, you will note gives you the choice of either logarithmic or linear amplitude response. The "A" section of *Sw1*, when in the

"linear" position, disconnects the a-v-c voltage and grounds the grid return circuit so that no a-v-c voltage is applied. The "B" section of the switch changes the fixed bias that is created across the one cathode resistor, *R3*, by bleeder action to the B plus line through resistor *R4*. The video detector, *V2a*, is one-half of a *12AU7*. The diode detector is biased by the slight threshold voltage generated across resistor *R14*. The second portion of the *12AU7*, *V2b*, is the video amplifier that raises the signal level to a few volts so that the average oscilloscope vertical deflection amplifiers will not have any trouble with insufficient signal. The 4.0 μ fd. coupling condenser is necessary to handle the low frequency response of the rectified signal envelope at the very slow sweep rates used in the "Ferri-Sweeper."

The i-f transformer, *T1*, must be loaded down with resistors and over-coupled with a 10 μ fd. capacitor, *C4*, in order that the band-pass of the transformer will not affect the response of the filter amplitude characteristic. This transformer must have a "3-db. bandwidth" of three to four times the expected bandwidth of the filter at its (the filter's) 40-db. points. In other words, the transformer must be "broad as a barn door" so as not to



give a false indication of the filter passband response. The *Ferri-Sweeper* should be fed into the *Log-Linear Amplifier* directly at the V1 grid circuit while the transformer is loaded and adjusted for the broad characteristic.

Calibrating the Log-Linear Amplifier

Now that we have an approximately logarithmic amplifier and detector arrangement we must calibrate it in order to make intelligent use of it. The circuit as shown is capable of giving a logarithmic response over approximately a 40-db. range of the input signal. It is now the builder's task to adjust the two controls labeled "Log-Zero Adj.", R5, and "Log Scale Adj.", R11. The *Ferri-Sweeper* must be used to calibrate the unit. A pair of series voltage dividers made up of many carbon resistors should be connected across the r-f output of the *Ferri-Sweeper* so that voltage ratios of one-hundred-to-one, ten-to-one, and two-to-one, etc. are available for calibrating the 'scope scale in decibels. See Fig. 2 for the schematics and the various db. calibration points.

The calibration run should be made using the following set-up: An i-f transformer in the 450-kc. range should be connected temporarily to the grid input terminal of the *Log-Linear*

- C1, C7—100 μ fd., 300v., mica.
 C2, C5—0.01 μ fd., 500v., disc ceramic.
 C3—500 μ fd., 500v., mica.
 C4—10 μ fd., 500v., mica.
 C6—300 μ fd., 300v., mica.
 C8—4.0 μ fd., 400v.
 R1—100,000 ohms, $\frac{1}{2}$ w.
 R2, R3—100 ohms, 1w.
 R4—33,000 ohms, 1w.
 R5—50,000-ohm potentiometer.
 R6—10,000 ohms, 1w.
 R7—47,000 ohms, 1w.
 R8, R9—10,000 ohms, $\frac{1}{2}$ w.
 R10—68,000 ohms, $\frac{1}{2}$ w.
 R11—100,000-ohm potentiometer.
 R12—220,000 ohms, $\frac{1}{2}$ w.
 R13—620 ohms, 1w.
 R14—120 ohms, $\frac{1}{2}$ w.
 R15—150,000 ohms, 2w.
 Sw1—DPDT wafer switch.
 T1—I-f transformer, Miller 1484-C.

Fig. 1. Parts list and schematic of the log-linear detector. This device is of great value in the alignment of SSB filters. See our book "Single Sideband Techniques" for complete details.

Amplifier. Any replacement or surplus i-f transformer will be satisfactory as long as it can be tuned to the range of interest to the user. The *Ferri-Sweeper* should be connected across the input terminals of the resistance voltage-divider and the movable tap should be connected to the primary "hot" lead of the i-f transformer. The ground lead should be returned to the ground end of the voltage divider.

With the *Log-Linear* unit set in the "Linear" operating position of Sw1, the i-f transformer should be peaked at about 450 kc. The usual transformer response curve will be noted on the oscilloscope. With the tap on the voltage divider set for the "zero db." position, adjust the output control of the *Ferri-Sweeper* so that the pip on the oscilloscope shows no signs of saturation or non-linearity in the i-f amplifier of the *Log-Linear* unit. Note—this is still with Sw1 in the linear position. Now switch Sw1 to the "log" position and you will notice that the amplitude of the pip on the scope may have changed size depending on where R11 (Figure 1) is set. If R11 was set all the way to the top as shown in this figure the pip would decrease in size and if R11 was set all the way to the bottom no change would take place. Set R11 for maximum a-v-c voltage (to the top) and make the following checks: Move the tap on the voltage divider to the 20-db

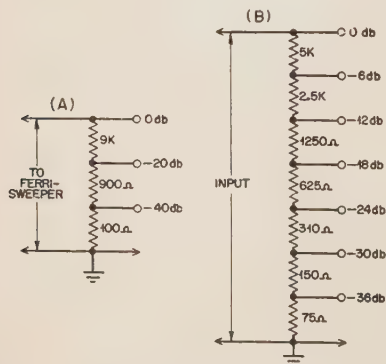


Figure 2. Two voltage dividers used to calibrate the log-linear amplifier unit. See text for details.

point and determine how much the pip has increased in amplitude. We are aiming toward the end result of having the pip decrease to one-half of its original size when the input is dropped 20-db. (or ten-to-one in voltage). Your problem now is to arrive at a pair of settings for $R11$ and $R5$ so that the 20-db. reduction in input will produce a decrease in pip-size of one-half and a reduction of 40-db. in input should leave just a pimple in the oscilloscope base line—roughly one-tenth or less of the size of the original pip. It will take a little "floodling" and patience on your part, but a combination of the two controls will give the desired results.

At this point the oscilloscope must be given "standard" gain adjustment to which it can be reset at any future date so that the calibration scale may be reused. The oscilloscope gain or the "zero-db." input attenuation tap should be set near full deflection on the oscilloscope tube screen. The second voltage divider should be substituted for the 20 and 40 db. divider so that intermediate calibration points can be made every 6 db. A piece of masking tape placed along the edge of the oscilloscope screen can serve as a calibration scale. Mark the "zero-db." point on the tape opposite the point where the top of the pip comes from zero-db. attenuation, and then proceed to increase the input attenuation in six-db steps. At each step a mark should be made on the tape opposite where the "nose" of the pip comes to rest. In this way you will be able to get a good calibration of the *Log Linear Amplifier*. From this

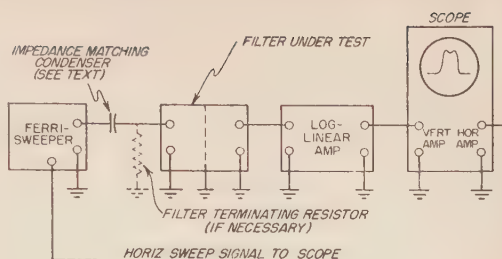
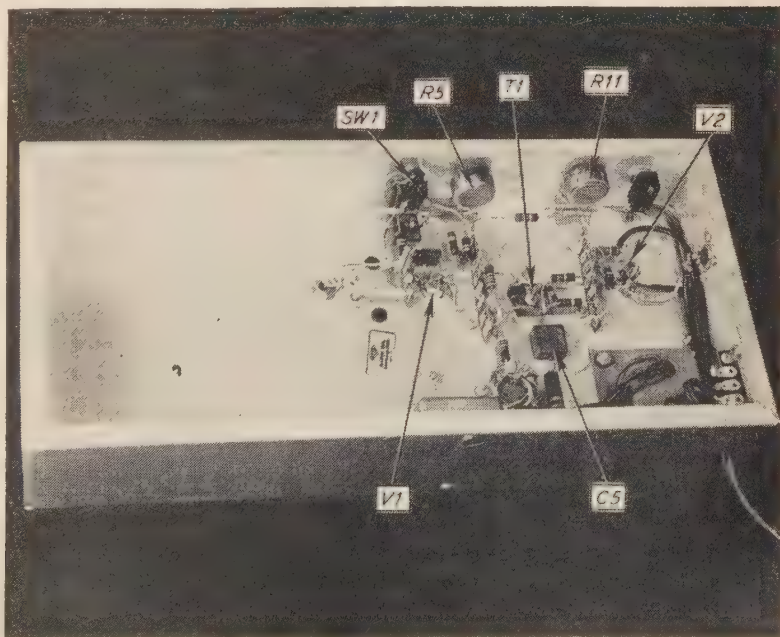


Fig. 3. This is the arrangement of the test equipment for an SSB filter alignment. The use of the "impedance matching" condenser was described on page 109 of our book "Single Sideband Techniques." Essentially, it is to avoid loading down the sweep generator output with the filter under test. The condenser should have a very small value and the author has found that 4.0 $\mu\text{mfd.}$ is quite satisfactory.

point on, the settings of controls $R5$ and $R11$ are not to be disturbed, and proper notation of the oscilloscope gain settings must also be made so that the calibration will hold true for future experiments.

All of the preceding procedure has been a bit involved, but for the serious minded experimenter shouldn't constitute a pit-fall.

See Figure 3 for a block diagram of the equipment set-up to be used in aligning a filter using the *Ferri-Sweeper* and *Log-Linear Amplifier*. Proceed cautiously and patiently and the reward will be a good filter.



Under view of the log-linear amplifier and detector

match almost any tube with

CHICAGO STANDARD

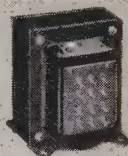
"POLY-PEDANCE"

MODULATION

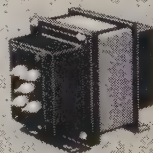
TRANSFORMERS

These multi-tapped Stancor transformers will match all common impedances of Class "B" modulators to Class "C" load impedances of 2,000 to 20,000 ohms. With these versatile units in your rig you can change transmitting tubes or operating characteristics without having to invest in a new modulation transformer.

PART NO.	MAX. WATTS	MAX. D.C.	MTG. TYPE	LIST PRICE
A-3891	15	Pri—100 ma Sec—100 ma	D	\$13.60
A-3892	30	Pri—150 ma Sec—150 ma	D	17.20
A-3893	60	Pri—180 ma Sec—180 ma	D	18.60
A-3894	125	Pri—225 ma Sec—225 ma	D	22.50
A-3898	300	Pri—260 ma Sec—260 ma	FS	70.65
A-3899	600	Pri—500 ma Sec—500 ma	FS	140.70



D



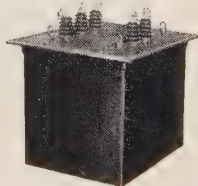
FS

There are many other Chicago - Stancor modulation transformers, for every class of operation, from this



5 watt, 1 pound, Stancor unit,
Part No. A-3812

to this 5KW, 1100 pound
Chicago "Sealed-in-
Steel" modulation trans-
former (Part No. BM-3)
for 891-R tubes



and they are all stock units—sold by your
local Chicago Standard distributor.

All of these transformers—and
over 1000 more—for every
electronic application—will be
found in the Chicago-Stancor
Catalogs—FREE at your dis-
tributor.



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the YL's Frequency



Louisa B. Sando, W5RZJ

Jicarilla Apache School, Dulce, New Mexico

Big news at the moment is the *International YLRL Convention* scheduled for next June. This will be the very first convention for YLRL, now in its 16th year. Convention chairman, W6UHA, Maxine, has set the date for the weekend of June 25, 1955. The place will be the beautiful Hotel Miramar on the shores of the Pacific Ocean at Santa Monica, California.

Results of the poll of YLRL members showed that the majority of YLs wishing a convention wanted it at a nice hotel, instead of trying to economize by using some public building. Hence, the selection of the Hotel Miramar, which Maxine found will be as reasonable as less popular places.

Watch this column for further details on the convention as Maxine, and the Los Angeles YLRC as her committee, develop plans for the affair. And start your planning now for that big weekend!

Nuns Are YLs

One of the wonderful things about our hobby is that *anyone* can become a Ham—young or old, rich or poor, lowly or exalted. Ham radio even serves with God, as many religious leaders are radio amateurs. There is a priests' radio club in southern Wisconsin, and many are the marriage ceremonies for Hams performed by ministers or priests who are themselves Hams.

Not so many are the YLs whose life work is religious service. Among the nuns, we know of only four who are licensed radio operators: W9CLE,

Mother Lawrence; W9CLW, Mother Reilly; W7MUT, Sister Charlotte, and W1HUH, Sister Emiliana.

As with all of us, there had to be some special incentive that lead to an operator's license. In Mother Reilly's case, she became interested in short-wave radio when she wanted to copy messages directly from the Vatican and W9GAP installed one of his receivers for her at Barat College, Lake Forest, Ill., of which she was president for over twenty years. Mother Lawrence, then on leave from Barat to study for her Ph.D., became interested when she returned to Barat in 1950, and together the two nuns set to work to master code. Soon they were aided by W9BWR, a CPO at Great Lakes NTC, who taught them theory. In the spring of '51 they both received their general licenses.

Meanwhile some of Barat's students caught the amateur fever and the Barat College Radio Club was started, using the call W9HEH, and with Mother Lawrence as trustee. W9BWR continued to assist with instruction to the students and when he left for several years' duty in the Pacific he lent his equipment to the club. This consists of a 2-meter *Motorola* station with a ground plane antenna. Another station of W9BWR's Mother Lawrence has set up in the chemistry balance room (she is associate professor of chemistry) which is for the use of Novices primarily. The xmtr is an *Eldico TR-75*, the receiver an *SX-28*, and they use a center-fed half-wave antenna on the 80-meter Novice band. The main station of W9HEH is a *Viking II* with VFO,

W9CLE, Mother Lawrence, center background, with members of the Barat College Radio Club operating its station W9HEH. At the mike is Ileana Viqueira from Puerto Rico. Standing, Astrid Manquial of Puerto Rico, left, and at right, Flor Rosales from Colombia. Waukegan News Sun photo.



Matchbox antenna coupler, TVI suppressor, SWR bridge and signal sentry. Receiver is an HRO-7. Antennas are an end-fed Zepp on 80 meters and a beam for 20 meters.

This summer Mother Reilly was transferred to head the psychology department of Forest Ridge College in Seattle, Wash., so Mother Lawrence carries on alone with the radio club at Barat College, with assistance from W9RON, chief engineer of their broadcast studio which has a wire to WKRS in Waukegan. Mother Lawrence reports the club is progressing well and the girls, despite a heavy college schedule, are asking for more time for Ham radio.

For many years W1HUH, Sister Emiliana, was the only nun to be a licensed amateur, having received her call in 1933. She operates from the convent of



W7MUT, Sister Charlotte, operates from St. Teresa's Academy at Boise, Idaho.

St. Xavier's in Providence, R.I. Sister Emiliana teaches shop work to the boys at Tyler School, the only Sister in the state to do such work. It was for the boys' sakes that she delved into radio and she took to it as naturally as she does her teaching, which includes everything from making bows and arrows to caulking boats. She teaches about 200 boys a week: 5th to 8th graders learn woodworking; 9th graders take drafting. W1HUH runs 500 watts mostly on 20 meters. She has WAS and likes to work DX, for she feels that amateur radio is one answer to world unity.

The next nun to join Sister Emiliana as a YL was Sister Charlotte who became W7MUT in 1948. Her interest in radio dates back to crystal sets for she is a science teacher at St. Teresa's Academy at Boise, Idaho. Her interest in electronics grew for the benefit of her classes and at present she sponsors a radio club composed of girls and boys from the freshman class.

W7MUT started out with a 701 McMurdo Silver and an NC57 which an aunt gave her on Sister Charlotte's silver jubilee of being a Sister. 80 and 40 CW were her first interest, then 10-meter phone. Sister Charlotte says her chief job in Ham radio now is to help prospective Hams as she also was helped, and she has given the exam to many around Boise. She also is a member of MARS, holds WAS and RCC certificates, and is a member of the Buzzard net, the Polecat net, and the Dogcatchers net. It was some of the "Buzzards" who built her present rig for her, brought it to her from California and

installed it. She uses a 300-watt final, using 211's push-pull and 211's as modulators, driven by command transmitters. Her antenna is a 136 Zepp, plus a 10-meter beam on top of the school and she receives with an SX-28.

This summer Sister Charlotte was awarded a fellowship to Massachusetts Institute of Technology and while there visited W1HUH in Providence. "What a wonderful person!" she exclaims—as indeed all of these women must be. We are proud to have them in our ranks of YLs.

YLRL

President W6CEE lists these new YLRL appointments: District Chairman for Africa, ZS6MW, Joy Jones; Europe and England, PA0ZC, Louise ten Herkel; New Zealand and Australia, ZL4GR, Myrtle Earland.

W6KER, YLRL VP, reports another net to add to list which appeared in this column last month: 40-me phone (7215 kc.), Thursdays, 10 a.m. EST, NCS W4S4 alternate W8HWX.

Conventions

Thirteen YLs attended the Oregon Amateur Radio Convention held at Klamath Falls in June: W7s N. Beth; N7T, Lydia; ITZ, Ruth; GLK, Dot; RAX, Justine; JFM, Doris; SBS, Luryn; UPN, Bertie; SBW, Pauline; SBX, Helen; HHH, Bea; WN7VLI, Jacquetta; and K6CXZ, Ray.

The West Gulf Division Convention held at Kerrville, Texas Oct. 2-3 was enjoyed by sixteen YLs. The YLs: W5DEH, Martha, was in charge of YL and XYL activities and entertainment included a style show, luncheon, bingo party, dance and other activities shared with the OMs. YLs attending: W5s WXT, Inez; QX, Marge; TSE, Ella; DUR, Bruce; AMI, Fannie; YC, Jane; KQG, Frances; EWH, Vivian; DEW, Mary; WN, Mackey; JAD, Ethel; RYX, Lyn; SPV, Pat; SYL, Irene; YAJ, Peggy; EGD, Lillian.

The New England Division Convention at Manchester, N.H., on Oct. 10, drew nearly thirty YLs from all the N.E. states and New York. A YLRL meeting was held with W1VOS, Marge, as chairman. Lucky gal the evening was W1YPH, Leona, who won the prize for a Hallicrafters SX-88 receiver.

Congratulations

To W2OWL and OM who celebrated their 25th wedding anniversary Aug. 25. To W3QQF, Barbie, and OM W3MAX on the arrival of a "second portable mode" Robert, on Aug. 26. To WN5EQW, Anne, and W5DMO on arrival of a daughter in September.

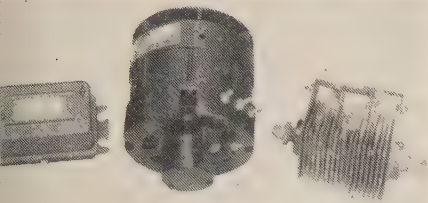
To W0QZS, Marian, and W0MCI who were married on Sept. 4. To W0IHH, Carol, and W0BUR who married via Ham radio and who set their wedding date on Sept. 5.

Here and There

When hurricanes Carol and Edna roared through New England these YLs assisted in handling emergency traffic: W1s VXC, June; YPT, Louise; VOS, Marge; UE, Eunice; W2s JZX, Vi; BNC, Helen, and the other YLs on the 2nd Regional Phone Net and the Interstate Net. W1BCU did CD work. . . . W1YYM, Ellen, has been faithfully carrying on beginners classes. Let YLs to qualify for licenses under her tutelage are W1CIE, Connie; CIJ, Muriel; CIM, Lorraine, and CIJ, Joan. . . . The Boulder (Colo.) Daily Camera devoted an entire section to the National Bureau of Standards the time of the dedication of the new NBS buildings in Boulder in September by President Eisenhower. A special interest was a fine photo of W3LSX/0, K, shown grinding crystals in the CRPL. . . . The 2 district YLs have enjoyed meeting the 3rd Thursday each month on 3900 kc. at 9:30 a.m. to get better acquainted. . . . W2WCL, Kay is an assistant director of the Hudson Division. . . . Ex-W4HWR, Hilda, back from England, is now on 75 as K2IW0. . . . W6QYL, Martha has been hospitalized for several months. Her QT Cabin 90, Box A, Cottagers Sanitarium, Monrovia, Cal.

Thanks to W5CA, W5RZJ is back on the air again. We'll be looking for YLs especially on 20 phone. 'Till next month, 33—W5RZJ

ESSE XMAS SPECIALS



"SAVE OVER \$100 ON THIS TREMENDOUS SURPLUS BUY."

5024 G3 alternator delivers up to 100 amperes of charging current from 1500 Rpm to 12,000 Rpm. Alternator output is 3 phase AC (frequency is 1/10 Rpm). This is rectified dry diode rectifier supplied to produce 100 amps. at 6 V. It will end your mobile battery problems and allow you to that hi-power rig. Some amateurs are stepping up the AC output of the alternator by suitable transformers and operating at the cheap 400 cycle surplus gear. Battery voltage & current is taken care of through the regulator supplied. These replace your original 6 volt generator equip. by use of suitable mounts which may be obtained from your local Leece-Neville distributor or we can supply at addn. cost. These new mounting kits contain all necessary hardware and wiring where final is not used. Price of these kits range from \$20 to \$50 depending to car or truck make and model.

LEECE-NEVILLE 100 AMP. ALTERNATOR - - \$49.50

Originally Sells For \$216.95

FEATURES:

1. 100 Amp. Charging Current
2. Charging current while motor idles
3. Eliminates generator hash & whine
4. AC output may be stepped up to operate 400 cycle surplus equipment

Above alternator, rectifier, and Type 3044-R3 regulator for 60 amp. output with circuit diagram, used but guaranteed.....

\$49.50

5024-G3 Alternator, rectifier, and 3082-R-3 regulator for 100 amp. output with circuit diagram, used but guaranteed.....

\$59.50

Include with order make and model of car or truck if mounting kit is desired (kit includes brackets, wiring harness, pulley and hardware). Kit cost \$20 to \$50 addn. and will be sent COD with order at prevalent factory price. Allow 10 days on kit orders as all types not in stock.

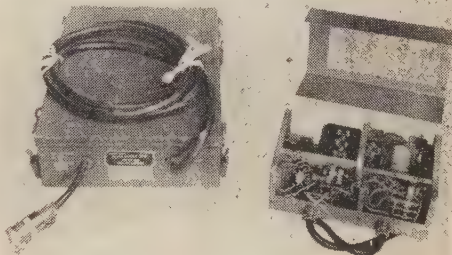
Ship wgt. alternator, rectifier and regulator 45 lbs.

6 OR 12 VOLT POWER SUPPLY - - - \$3.95

117 vibrator power supply was designed for use on the Army 620 Transmitter and receiver a part of the SCR-509 and 510. This will make an ideal supply for your mobile equipment on either the 6 or 12 volt cars. Voltage input changes are accomplished by merely changing links according to diagram in the (same vibrator used in either case). Supply is well filtered choke input and plug-in type capacitors. Additional hash filter is also incorporated for filaments of receiver. Output voltages for transmitting 140 V. and 90 volts for receiving. The receiver output voltage is regulated by voltage regulator tube VT184. Maximum current drain is 100 Ma. Entire unit measures 12"x15"x4 3/4" metal case or supply only may be removed for use which measures 6"x4 1/2". If you have no immediate use for this unit, it would be a good investment for possible future use. This is the type of unit that doesn't last long at this price. Shipping wgt. approx. 1 lbs.

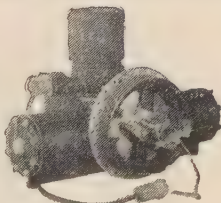
Brand new units - - - \$4.95

Used good units - - - \$3.95



I-1 SERVO UNIT FOR BEAM ROTATION

It has self-contained hydraulic pump actuated 27 V.—11 Amp. 1/5 hp. motor which pumps oil into upper side of hydraulic cylinder giving better than 100 lb. torque to cable drum. Unit is reversible by rotation of either of two contained solenoid hydraulic valves. Connect by pipe around antenna beam as any desired rotation required. Greater adaptability than any other surplus unit on the market. Shg. wgt. 37 lbs. **\$4.95** AND NEW—Only a few, order early



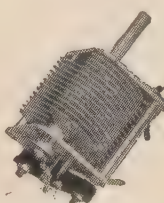
AN/ART-4 TRANSMITTERS & TARGET

6' x 30' plastic screen target containing two transmitters complete with microphones. One transmitter on 55.5 Mc., other on 56.75 Mc. 3/4 watt output using 3A5 tubes. Dry battery operated (batteries not included). Brand new, in wood box 10" x 12" x 75". Shipping Wgt. 75 lbs. Box or plastic screen alone worth price. **\$3.95** NEW.....ea.



RELAY - TELEPHONE TYPE SW 37

150 ohm DC. Adjustable for spring tension, amateur distance, and point contact, allows sensitivity variations. May be used also for telegraph sounder. Size 8"x4 3/8"x4". Shipping weight 3 1/2 lbs. **\$3.95** New Priceea.

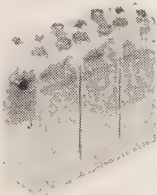


VARIABLE CONDENSER

Freq. Meter type, 245 MMFD. 27 plate mdgt. type. Gold plated heavily constructed. Approximately 3"x2 1/2"x1 1/4" overall size with 1 1/4"-1 1/4" shaft extension. Shipping weight 1 lb. **\$1.25** New Priceea.

ESSE XMAS SPECIALS

NEW STORAGE BATTERIES



ER-25-6, 6V. 25 AH.

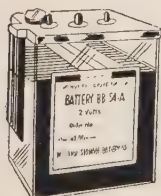
Plastic case size $7\frac{1}{2}$ " x $2-9/16$ " x $6\frac{3}{8}$ " h. dry charged, fill as above.

New price **\$3.95**
Wt. $7\frac{1}{4}$ lbs. dry.

STORAGE BATTERY 6 V. 34 AH

3-TA5-9B—Manufactured by Exide Battery Co. for aircraft. Size $5" \times 5" \times 9"$ overall. Shipping weight 15 lbs. New dry charged. Fill with 1.265 sp.g. sulphuric acid.

Priceea. **\$5.75**



BB-54-A 2V. 34 AH.

Plastic case size $4" \times 3" \times 5\frac{3}{8}"$ h. Dry charged, fill as above.

Wt. $3\frac{1}{2}$ lbs. **\$2.75**
Price

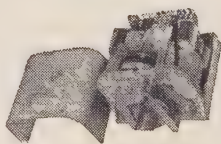
ER-40-4, 4 Volt, 40 AH.

Plastic case size $6\frac{1}{2}" \times 5\frac{3}{4}" \times 4\frac{3}{8}"$ h. dry chg. fill as above. Wt. 10 lbs. dry. Priceea. **\$4.95**

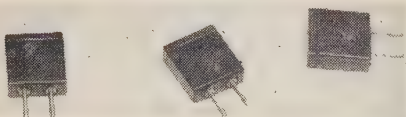
C-1 AUTO PILOT SERVO

Use for boat rudder control, beam antenna rotation, or garage door lift. (A very good lift using this motor is mfgd. in our city and may be purchased from us at \$137.50). Motor pulley rotation is reversed thru a clever differential and electric solenoid mechanism allowing instant reversal without undue stress on motor. Operates on 24 V. DC. Size overall $10\frac{1}{2}" \times 8\frac{1}{2}" \times 6\frac{1}{2}"$. Wgt. approx.

20 lbs. Brand Newea. **\$9.95**



CRYSTALS - - Kit of 10 - \$2.95



Brand new crystals mounted in FT-241-A holders. Freq. of these crystals calibrated in megacycles from 20 to 40 picked at random. No. two kits possibly alike so order several for good selection. Crystal freq. is approx. $1/3$ freq. given in Mc.

Kit of 10 crystals **\$2.95**

NEW DYNAMOTORS

BRAND NEW 12 V. DYNAMOTORS

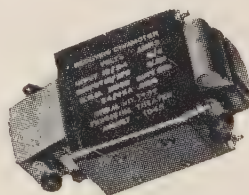
DM-40 Input: 12-14 V. 3.4 A. Output: 172 V. -138 MA. Here is an ideal dynamotor to adapt to mobile uses on the new 12 V. cars. Don't pass up this buy even if your intended uses are not immediate. Size $6\frac{3}{4}"$ L x $3\frac{1}{2}"$ dia. 4" lead with 6 pin Jones plug. Shipping weight $7\frac{1}{2}$ lbs.

New Priceea. **\$2.75**



274-N Dynamotor and Modulator unit

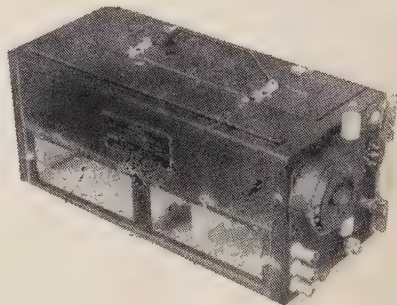
Output is 540 V @ 250 Ma. with 24 V. 7 amp. input. Modulator unit contains VR150-30, 1626, and 12J5-GT tubes. Wgt. $17\frac{3}{4}$ lbs. Units are used but good condition. Close out price.ea. **\$1.95**



PM DYNAMOTOR 12V.

12 or 24 volt DC input @ $8\frac{1}{4}$ amps. Output 275 volts @ 110 ma. Dimensions: $7\frac{1}{2}"$ L x $2\frac{7}{8}"$ W x $4\frac{1}{4}"$ D. Ship. wgt. 10 lbs.ea. **\$1.95**

CAP & MOBILE HAMS ATTENTION RECEIVER - - \$3.95 RU-19 Aircraft Receiver CW46048D



Here is a receiver that is cheaply priced that any one can afford and use. Made to operate from 24 V. DC and dynamotor supply not supplied but an AC supply or mobile supply can be readily adapted. Receiver uses 6 tubes, three of which are type 78, one type 77, and one 38233. Size of unit $14\frac{1}{2}"$ long x $6\frac{3}{4}"$ sq. Wgt. approx. 13 lbs. Similar to pict. Used good cond. supplied with either coil of your choice listed below.

Addn. coils 75c ea.Total price ea. **\$3.95**
Coils for roc. for following freq.
Dual coils L-N 390-634 Kc. and 5915-9120 Kc.
Dual coil Q-Q 524-844 Kc. and 2960-4620 Kc.
Dual coil Q-M 2960-4620 Kc. and 5075-7780 Kc.
Single coil F 1975-3320 Kc.

NEW SURPLUS TRANSFORMER BARGAINS

MULTI-SECONDARY FILAMENT TRANSFORMER



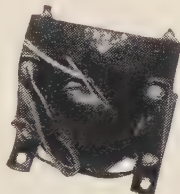
9 secondary 6.3 V. at .01-3 amps. One sec. 2½ V at 2½ A; one sec. 2.5 V. @ 10 A. Two sec. 2.5 V @ 5A; Two 5 V. @ 3 A. 110 V. 60 cycle primary — up to 5000 V. ins. test. Size 5"x 5½"x6½" H. Shipping weight 21 lbs. New Priceea. **\$3.95**

ITC POWER TRANSFORMER - \$3.95

17. 105-125 V. 60 cy. ec: 400-0-400 V. at 125 Ma. and 475, 875, 1275 V. at 5 Ma. Five filament windings of 6.3 V. at 1 A; 6.3 V. at .6 A; 5 V. at 3 A; and 6.3 V. at 6 A; 2.5 V at 2 A. Brand new in metal can size 5"x5"x4" with porcelain insulated screw type terminals extending ¾". 3½"x3" mounting center studs. Wgt. 12 lbs. PRICE NEW **\$3.95**

12 V. VIBRATOR TRANSFORMER

00 V. @ 65 Ma. output. Ideal for your new car receivers. High quality type transformer designed originally for aircraft. Size overall 7½"x2½"x2½" **95¢** ea.

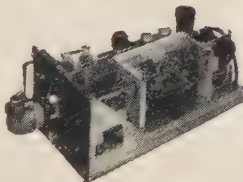


TANCOR AUTOCFORMER — Type D-12A-3552

17 V. input at 2.5 Amp. Output 423 V. at .8 Amps. Cap. load 5 MMF. Metal case 6½"x5¼"x5" h. Wgt. 15 lbs. Cost \$28.00. Your price. **\$3.95**

T-39/APQ-9 RADAR XMTR

described in Feb. '50 "CQ" for conversion for the 420-50 Mc. amateur band and citizens band. Also contains any parts for the UHF experimenter such as 2—8012 tubes, fan and motor, switches, pots, gears, counter, etc. equipment removed from aircraft. Our Close Out, quantity limited. **\$4.95** ea. Shipping wt. 43 lbs.



ZB-3 HOMING ADAPTOR (ALSO ARR-1)



deal Converter for Ham use. Dial calibrated 234 to 58 Mc. Uses 4—954 tubes (included). For 12 or 24 V. DC operation. Wgt. 4 lbs., size 3¾" x 3¾" x 11½". removed from military aircraft **\$4.95** FINAL CLOSE-OUT, ONLY A FEW LEFT

OUTPUT TRANSFORMER

Shielded pri. Imp. 3 ohms. Sec. impedance 300 ohms. Ratio 9.32:1. Size 1½"x7½" sq. Ins. breakdown at 1000 V. Orig. cost \$2.95. New price.ea. **29¢**

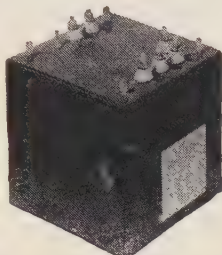


PLATE POWER TRANSFORMER

355-0-355 Volts @ 325 Ma. Also 490 V. 325 Ma. Primary 117 Volts 60 cycle. Measures 5" x 5½" x 6". Shipping wt. 22 lbs. PRICE **\$2.95**

H. V. TRANSFORMER

Output 1500 V., 5 MA and 6.3 V. at .6A 5000 V. test and 2.5 V. at 1.75 A. Input: 115 V. 60 cycles. Size 4½"x5"x¾" Shipping weight 6 lbs. **\$3.50** New Priceea.

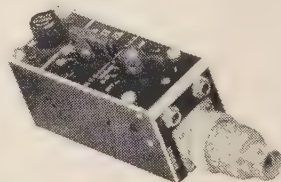


UTC OSCILLATION TRANSFORMER, Type 48492

or equal size 1½" dia. x 2¾" h. P/O Interphone amplifier. Ship. wgt. 1 lb. Orig. cost \$2.59. Your costea. **39¢**

AUDIO REPEAT TRANSFORMER—Kenyon SH479

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RECEIVER TUNING HEAD CRV-23252—used with CRV-46151 Rec. for remote vernier tuning. Has beveled dial with hairline cursor. Bands are spread over 280° of dial. Adapts to flex. shaft or may be adapted for direct drive. Black crackle finish. Size 5"x3"x2" overall. **75¢** Price, Brand New.....ea.

PILOTS CONTROL BOX 23254—for rec. CRV-46151.

Black crackle finish. Size 2"x2½"x5" h. Brand New, Price.....ea. **75¢** See September "CQ" for further information if desired.

ANTENNA CONTROL BOX BC-1285

Contains relays, toggle switch, pots, etc. Complete with multi-cond. cable all glass insulated 9½" long in breeze shield. Units are new. Only a few to close out at.ea. **\$2.75**

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The HOT ROD Bottle . . .

Have you ever cursed out the fellow Ham that drives the kilowatt and zeroes in on you to drive out your modest 50-watter? Have you ever wanted to be one of the Sunday morning boys on 14,000.01? If you have, then this might be the article to solve all your troubles.

First, take a look at this problem of high power versus iron-clad regulations. It is written, "... the input to the final amplifier shall not exceed 100 watts." Now applying basic logic, it follows that a tube could be invented that operated at a 100 power input, but was capable of power multiplication (say fifty times) you could really gray the hair of the boys on kilowatt alley. For example, say you're pushing the old 807 at 50 watts input, but then you replaced it with an 807X that still drew only 50, although pumping out something like 2500 watts. Would you go for it? I suspect you would and the beauty of it all is—I have just made such a tube and you can do it too. Interested?

Theory

Why do tube manufacturers evacuate the air from the tubes they sell us? You immediately say, "that the filament will not meet an untimely spectacular demise." But I say that this vacuum makes the passage of large quantities of electrons difficult . . . the reason present day tubes are inefficient.

Using high school logic once again, it follows that if a substance were pumped *into* the tube that did not support combustion—and which was a good conductor of free electrons . . . well you could supply the rest.

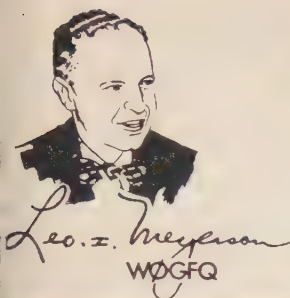
Experiments

In my first experiments, I used the substance that was closest at hand—water, with a little salt added to improve the conductivity. It can be easily shown that a solution of salt water will conduct an electric current fifty times better than a vacuum. So the recipe for souping up your present final amplifier is quite simple. Drill a hole in the plate cap, being careful not to disturb the filament, and with the aid of a water pistol, squirt salt water into the tube until it is filled. Drop a blob of solder on the hole in the plate cap and presto—HIGH POWER!

One of the first tubes I modified was a 6AK6. The glass seal was broken and the tube filled with salt water. After replacing it in my transmitter, I took the r-f ammeter off the shelf and set the scale for 100 amps. As I applied the juice to the 6AK6 tube, the meter assumed a strange bluish hue and slowly the entire rig melted away. I wept—not at the sight of my hard earned components running off the table but with the proud happiness of a man that knows his name will be long remembered by fellow Ham. I had forgotten about the inverse power law—the smaller the bottle, the bigger the gain factor. Subsequent experiments with a big 4-400 showed that the little gain results from the salt water treatment.

Yes, there is something new in Ham radio. Since the high power boys won't be able to use this scheme, it looks as though the "small fry" will be able to take over as the privileged class in Hamdom. The possibilities are enormous. Currently I'm working on a means to water those geraniums in a transistor. Who knows—WAZ with a hunk of rock n' roll be just around the corner.

DAN BERESKIN, VE5D



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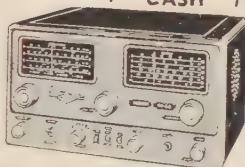


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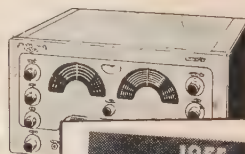
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1S5	.55	211/VT40	.75	955	.30
1T4	.45	250TH	10.00	956	.30
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2C44	.75	814A	100.00	1625	.25
2K22	15.00	316A	.29	1629	.30
2K25	17.50	342A	300.00	2050	1.10
2K26	45.00	850B	4.00	2051	.75
2K28	30.00	403B	3.00	5644	8.95
2K41	70.00	431A	P.U.R.	5654	1.65
2K45	75.00	437A	125.00	5677	2.50
2K54	50.00	438A	P.U.R.	5696	1.65
2K55	50.00	446A	.89	5719	4.00
2K56	70.00	454H	P.U.R.	5725	2.75
2X2A	2.75	464A	2.95	5726	1.25
3BP1	2.75	471A	1.95	5749	1.50
3B24	4.50	KU627	15.95	5750	1.75
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3C24/24G	.89	723A/B	10.00	5814	1.65
3D22	7.50	726C	35.00	5902	6.00
3EP1	1.00	800	1.00	6005	2.50
3E29	7.95	801A	.29	6111	7.50
3FP7	1.50	805	2.25	6112	7.00
4-65A	15.00	807	.95	6136	1.75
4E27	8.95	808	1.50	6201	3.75
4X150A	27.50				

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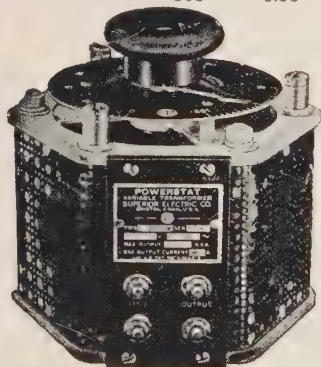
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DX NEWS

[from page 24]

OK1MB would also welcome one from YS10. Catherine, OQ5GI, visited W3BHV while Al, W8P, paid a visit to the shacks of W8CTJ, W3KT, W3LV3GHM, W3CGS, W3GHD and K2EDL.

21 Megacycles

During September and October a marked increase activity and improvement on this band has been noticed. In fact, at times, we thought we had switched to 14 by mistake. A report from Ross, W4DQU, notes contacts with EL10A, EL12A, ZS1BV, VQ2PL, ZE2JE VQ4

New Addresses

C3AR—CWO N. H. Morgan, OARMA, APO 63, c/o P. San Francisco, Calif.
CN8IA—Don, Box 50, Navy 214, FPO. N.Y.
CN8IE—Via W2ARE.
CR7MB—Box 12, Quelimane, Mozambique, P.E.A.
CR9AH—Joao Pires Antas, Oficialis Navais, Macao.
FA8GC—Jean Tolzane, Chez les Pere Blancs, Ouarg Terr. des Oasis, Dep. de Constantine, Alger.
FE8AN—Marcel Veber, Box 408, Douala, Camero F.E.A.
FF8AJ—Box 396, Abidjan, Ivory Coast, F.W.A.
F8AA—Box 449, Brazzaville, F.E.A.
FQ8AC—V. H. Fonsagrave, Port-Vila, New Hebrides.
HCAMK—Martin Kohls, Box 2327, Quito, Ecuador.
JDXRC—Japanese DX Radio Club, Box 7, Nerin Tokyo, Japan.
KR6IG—(Chi Chi Jima) Navy 905, P.M. San Francisco, Calif.
KV4BJ—Ed Kendall, C.A.A. Box 618, Christiansted, Croix, Virgin Is.
TI2RMA—Ricardo Montalegre A., Apartado 1523, S Jose, Costa Rica.
ex-TI2TG—Tom Gabbert, 1820 Poli St., Ventura, Calif.
VP6KL—(ex-G2KL) Frank Roberts, Watersmeet, Worthing, Barbados, B.W.I.
VQ6LQ—Chas. Box 11, Hargeisa, Br. Somaliland.
VS2—(pending) ex-G3GUK/VS9AW—Cpl. H. J. Wheeler 3500323, No. 1 Rec. Station Chikang, R. Maintenance Base, Seletar, Singapore Malaysia.
XZ2OM—F/LT Aung Myint, BAF. Box 1490, GH Rangoon, Burma.
ZB1CH—Chas. Holmes, Point de Vue Hotel, Rabat, Mal.
ZC7AM—Via G6UT.
ZP5GM—American Embassy, Asuncion, Paraguay.
4S7YL—Soma. Swarna Paya, Piliyaneala, Ceylon. (X of 4S7WA)
Thanks to KV4BB, W6YK, KR6OS, VQ2AB, W6TK, F9RS and the West Gulf DX Bulletin.

Honor Roll Endorsements

W6MEK	40-248	W9HUZ	39-216	GM3EST	38-2
W6SYG	40-247	KP4KD	39-207	W2GVZ	38-1
W9NDA	40-244	W3KDP	39-203	OE1FF	38-1
VE4RO	40-240	W4RBQ	39-198	PHONE ONLY	
W6VE	40-228	W6GPB	39-197	W9NDA	38-2
W5GEL	40-212	G3FXB	39-181	W1MCW	36-2
W8KIA	39-239	W1HA	38-205		

Last complete HONOR ROLL appeared in the Oct. issue. Next complete HONOR ROLL will appear in an early issue.

F900, CT18X among many others. VQ4EZ reports VQ5EYI5AM, ZC7BR, VS9 and 4S7 while LU8DB reports EA0AC and SV0WO. ZD9AC was heard on 21,100. The above are phone reports and A3 activity seems predominate. It would be well to keep an eye on the band as conditions improve. It's a welcome relief from the congestion encountered on twenty. Maritime Mobile activity has done much to sponsor increased activity here.

160 Meters

The December transatlantic tests take place on the 13 and nineteenth at 0500/0800 GMT. Watch for G (and other) stations between 1825 and 1875 kc. New Zealand

[Continued on next page]

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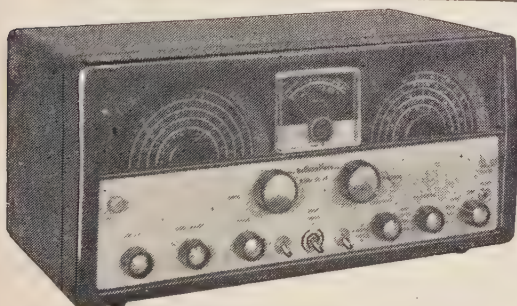
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S95	6.00	3.20	59.95
S85	12.00	6.50	119.95
S93	10.00	5.40	99.95
SX96	25.00	13.50	249.95
SX71	25.00	13.50	249.95
SX62A	35.00	19.00	349.95
SX88	59.50	32.40	595.00

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**SINCERE
GOOD WISHES
FOR THE
HOLIDAY SEASON
AND
THROUGHOUT
THE NEW YEAR**

**BUD RADIO, INC.
CLEVELAND, OHIO**

[from preceding page]

stations will use their new band, 1875/1900. East U.S.A. stations will use their assigned frequencies 1800/1825 and 1875/1900 while stations west of Mississippi appear on 1900/1925 and 1975/2000 kc. avoid mixups in calling and answering please synchronize your clocks to zero hour, 0500 GMT. An idea of possibilities may be had from G3EIZ who advises W2 and W4 250-watt BC stations are heard quite just before sunrise (0500/0530 GMT August) on 1240 and 1400 kcs. when WWV gives its forecast as . A report from Shely, W3RGQ, states that 160-mc crystals will be sent to any DX station so requesting he will participate in top band activity. This is sponsored by the TOP BAND DX CLUB. A few DX stations have promised to appear are: EL2X, YV5DE, TI34K4DP, LU3EL, VR3A, VE8MW and others. YU1FA8BG and EI9J will request special permission to use this band on a set frequency. Others known to be active are VS6CQ, VS6CW, VS6CZ, VS1FX, VS2EB, HZC5VS, ZC4CA, ZC4GF and ZB1BJ. Your reports will be welcomed at W1BB and W3RGQ. See you there!

MY FINAL EXCITER

[from page 20]

may be plugged in to determine just what grid current is, if that information should be desired.

For CW, switch *Sw2* bypasses the plate current meter and allows the meter to remain rest rather than following the keying cycle.

A clamp tube is used to keep the plate current down during periods when no excitation is applied. The popular 6Y6G tube, used also permitted the 6146 to draw enough current to just equal its rated dissipation rating. To get the 6146 time to cool off once in a while, the 6F6 was substituted and the VR105 installed. Now the clamping is much more effective because the voltage on the 6146 screen drops to zero when the 6F6 draws enough current to drop the voltage across the VR tube below 105, where it stops conducting. Resistor *R21* is the means by which the screen voltage is set at the desired figure for normal operation with excitation and a plate load.

Clamp-tube modulation was not contemplated in the design of this amplifier. If or any type of screen modulation is used, it will be necessary, of course, to short out VR105, *V9*. This also applies in the case of plate-screen modulation, since *V9* will induce serious clipping in the screen circuit, resulting in modulation distortion.

The amplifier case is divided in the middle by a copper partition which shields the 6146 tube and the output circuit. This copper shield is used for all ground connections. The ground input jack and its r.f. choke are on the "outside" side of the partition but individually enclosed and shielded. There is no r.f. loose in the compartment, so the wiring around the clamp tube, meter, tuning eye, etc. need not be shielded.

[Continued on page 54]

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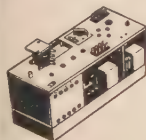


INDICATOR SCOPE ID6A/APN4

Made to operate in conjunction with Radio Receiver R9/APN4. Unit includes one 5" scope tube, crystal controlled standard oscillator, sweep circuits, marked pulses. Good cond. Weight 45 lbs.
WITH TUBES & CRYSTAL **\$19.95**

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140-144 MC. Complete with control box, tubes. 12/24 VDC dynamotor with schematic. Good cond.
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C.A.P. SPECIAL BC-625 VHF TRANSMITTER

Freq. range 110-156 MC. With modulation section and speech amplifier. Less tubes and crystals, with conversion dope. Used, good condition. (See Nov/53 CQ) **\$9.95**
Wt. 17 lbs.

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Self-Contained Automatic unit for code practice signals from an unkeyed type recording. Complete with 7 tubes and electric eye. Audio freq. output of 800 CPS. Size: 11x24x18 1/2"—110-220 VAC 60 cy.—78 RPM motor can be used for a turntable—Power unit can be used for a P.A. system—**\$14.95**
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2 for 10.00
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8 x 8 x 8 mfd @ 600 VDC. Ea. **1.25**

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Complete power supply in carrying case with input and output cables. Input voltage 12 VDC. Output 500 VDC @ 65 MA. 5200 RPM capacitors mounted in end bells to reduce interference. With starting panel. New with storage carrying case. Wt. 45 lbs. **\$7.95**

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105 to 9050 KC. Four Bands. Calibrated Dial, LF-Ship-BC 6 Volt. Size 8 1/4" x 7 1/4" x 15 1/4". Excellent cond. With—80 & 40 Meter—Complete with Tubes and Dynamotor. For 24 Volt operation; easily converted to 110 V—**\$19.95**
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In like-new condition. Wt. 43 lbs.

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APS-13

\$3.95



Freq. range 415-420 MC. 5 stages of 80 MC. IF amplifier. Complete with R.F. and I.F. sections. Less dynamotor, tubes, and tube shields, with schematic. Excel. cond. Weight 14 lbs.

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11-tube UHF tunable receiver with schematic. **\$14.95**
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Rack for above. **\$3.50** Control Box. **\$1.50**

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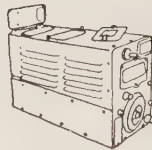
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EQUIPMENT**



Type

BC-455 Recvr. 6-9 Mc. Used, with tubes—Like New **\$3.95**

BC-454 Recvr. 3-6 Mc. Used, with tubes—Like New **\$7.95**

Dynamotor for above Recvrs. \$1.00 extra with each recvr.

BC-456 Modulator. Used with tubes.....	\$3.95
Sold as is, Less tubes.....	2.95
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BC-458 Xmtr. 5.3-7 Mc. Used, with tubes.....	3.95
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METERS—WESTON—SANGAMO

All New. All D.C. 2" Square.

0-2 Ma	\$3.29 each	or			
0-5 Ma					
0-15 Ma					
0-50 Ma	3 for \$9.00				
0-100 Ma					
0-200 Ma					
0-300 Ma					
0-500 Ma					

DC VOLT METERS 2" SQUARE

0-20 VDC	\$3.29 each or 3 for \$9.00
0-40 VDC	
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A SWEET OSCILLOSCOPE DEAL

BC 929 Radar Indicator Unit: For conversion to test scope or for use as modulation monitor. Has standard test-scope CR tube, H Cent, V Cent, Bril, Foc, Gain, and range selection switch, sweep, duration, all tubes included: 2-6HG, 2-6SN7, 1-6GG, 1-6X5, 1-2X2, 1-3BP1, and built in 110 v. 400 cy power supply. Brand new in original boxes..... **\$14.95**

GP-7 NAVY XMITTER. 100 watt master os. can use on any freq. from 350-9050 kc. by using proper plug-in. With 1 tuning unit. **\$13.95**

BC-375 MOD. XFMR—Matches pair of G146. New.. **\$2.95**

CASH WITH ORDER. Include 4% sales tax with California orders—plus approximate postage. Excess will be refunded. When in L.A. visit our showrooms and ask for Paul, W6QDK—Mgr.

SAM'S SURPLUS

1306 BOND STREET LOS ANGELES 15, CALIF.

At the author's location the only antenna is the well-known "random length of wire" up and out to a tree. The pi-network of circuit is a natural for this and loads it up. The coil is variable, a "roller" and coil from a BC-458 "Command" transmitter. The tuning condensers shown are from a set of "Gibson Girl" distress transmitters and very well, especially with the little switch on shaft that hooks in an additional 200 capacity across half the dial. *National TM* or similar variable condensers should be fine substitutes. If the antenna impedances are matched are low (no higher than 300 ohms) paralleled multi-section b.c. condenser (using about 140 μ fd. per section) should work for C24. The front panel was spaced, so output condenser C24 could be replaced with a tap switch for connecting in various fixed capacitors to match co-ax impedance, in case was generated to make necessary the use of co-ax cable to a harmonic filter and/or antenna tuner. This happily proved to be completely unnecessary.

R16 is adjusted for optimum grid current (about 3 ma. for the 6146), R17 is adjusted so that the tuning eye closes at maximum excitation (resonance of exciter output circuit). R21 is adjusted for correct screen voltage (max. 250 v. for 6146).

Power Supply

As mentioned before, the exciter power supply was included in the exciter chassis of the author's rig, and its circuit is that shown in Fig. 3. This figure also shows a suitable voltage supply for the 6146 final. Any power supply furnishing from 500 to 750 volts dc at 150 ma. will do.

In the exciter supply pictured here, a pilot lamp was used in place of the fuse. This serves as a ½-amp. fuse and pilot lamp and gives an immediate visual indication of overloads. This drops the primary voltage across the transformer by about 2 volts, which may not be desirable in your location.

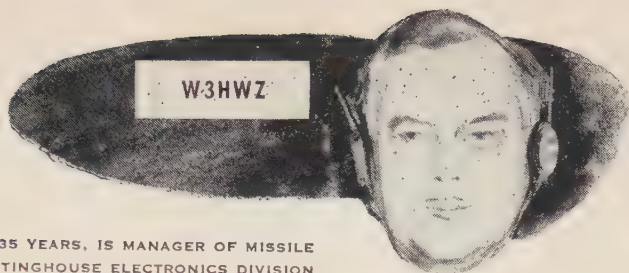
The slider on the VR-tube dropping resistor R22, should be set slightly above the position where the tube extinguishes with the exciter in operation, so that the tube stays lit under normal load conditions.

Operation and Performance

For CW, it is necessary only to press down the key to transmit, since the final plate voltage may be left on during listening periods. To change frequency, or VFO up and down band, it is necessary to retune the dual-diode denser C14-C18—if there is an appreciable change. Just tune this control for a maximum setting on the "magic eye." However, it

[Continued on page 56]

CQ
= : - : =



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MARK "35" Transmitter



Beautiful, rugged equipment that any Ham would be proud to have. Professionally engineered, factory built and thoroughly tested. Moderately priced for every amateur. See it at your local Ham distributor.

FEATURES

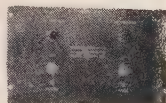
- 80 thru 10 meters
- 6AQ5 osc.—807 final
- Pi-coupler
- Final input to 60 watts
- Attractive dark gray cabinet Black front panel—6" x 9"

\$38.75
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Price of "MARK 35" Transmitter. Complete with tubes and one set of coils, your choice, less crystal.

Extra coils, any band
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Attractive matching unit for the "MARK 35" Transmitter. 360 VDC at 120 ma. Provides 35 watts input to the final.

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- R-846—Allied 75 Watt Coax Relay 6 VDC Receptical Takes Std. Coax Fittings. \$6.95
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- Relay Sales carries the world's largest stock of relays of all types. Each relay is new, individually inspected and unconditionally guaranteed. 24 Hour Delivery.

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SEley 8-4146

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**Relay
Sales**

[from page 54]

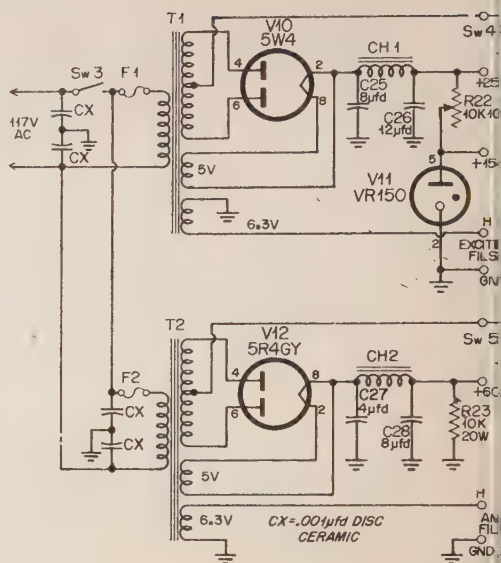


Fig. 3. Power supply diagram and parts list.

M—0-200 ma., d-c meter.

C25—8.0 μ fd., 450v., electrolytic.

C26—12.0 μ fd., 450v., electrolytic.

C27—4.0 μ fd., 900v.

C28—8.0 μ fd., 900v.

F1—1 amp. fuse or #43 pilot bulb (see text).

F2—3-amp. fuse.

Ch1—30 henries, 50 ma., choke.

Ch2—10 henries, 150 ma., choke.

R22—10,000 ohms, 10 watt, wire wound, adjustable.

R23—10,000 ohms, 20 watt, wire wound.

T1—Small receiver type power transformer with suitable high voltage and filament windings.

T2—Power transformer 600-0-600v., 5v. at 3 amp., 6.3v. at 2 amp.

Sw3, Sw4, Sw5—SPST toggle switches.

be highly recommended that both plate supplies be turned off before reaching into the final or exciter to make adjustments. For A operation, the final power-supply switch (Sw5, Fig. 3) may be used to turn off the transmitter. If switching off the v.f.o. signal is desired while listening, this may be accomplished by inserting a switch or key at J1.

So far this rig has been used only on CW except for one evening when a borrowed plate modulator was attached to it and a local test was run with a nearby Ham. There was a considerable mis-match of impedances and the quality was poor, but there were none of the black bars across the TV screen which so often accompany such endeavors. On CW the sign reports are quite gratifying. Even Hams right in town report, "No clicks—No chirps—No bad wave." From the neighbors there are no reports whatever. They are just as polite, just as friendly, and just as unsuspicious as ever my amateur radio activities.

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B....Buy
C....Columbia

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TPX-1 TRANSMITTER & RECEIVER

Excellent for 2-meter or 420 MC. Like new, complete. ONLY **\$14.95**

DUAL VOLTAGE GENERATOR

Operates @ 2700 rpm. Output voltage 14 VDC at 25 amps 1,000 VDC @ 350 ma. **\$14.95**
 New in overseas pack.

MC ELROY CODE MACHINE: Complete with Whitestone perator. New in overseas pack. **\$19.95**
 3-piece set.

PE-55 DYNAMOTORS: The ones you wanted! 12 V. input, 500 V. output @ 350 mls. Like new! Only **\$22.50**

New! OIL FILLED CONDENSERS New!

2 MFD @ 4,000 VDC \$4.95 8 MFD @ 600 VDC \$.89
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TOP-555 BUYS IN METERS!

HALLICRAFTERS "S" CARRIER LEVEL METER: 3" rd. 0-5 mil. basic movement. DB over \$9. New, boxed. **\$5.95**

SIMPSON METER: 3" rd. 0-15 mil. New, boxed. Special! **\$3.95**

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SCR-518 UHF ELECTRONIC ABSOLUTE ALTIMETER
 Terrific for conversion to 420 MC and citizen's bands. Consists of transmitter, receiver, indicator, power supply, control boxes, cables with plugs mounts, etc. Less tubes. NEW **\$19.95**
 Never before priced so low. ONLY.

SCR-183 12 V. RECEIVER & TRANSMITTER. Covers marine, aircraft & Ham bands with proper coil. WITH 2 coils, 2 control boxes, tuning head, flex cable, 12 V. dynamotor. Approx 25 W. output. With schematic. **\$12.95**

TRANSFORMER-CHOKE

CHOKE: 10 Henry, 100 MA. PLUS.
TRANSFORMER: Pri. 117 VAC, 60 cycles. Sec. 5 V. at 2 amp; Sec. 6.3 V. at 3 amp; Sec. 6.3 V. at 7.5 amp; Sec. 330 VDC using 3Y3 rectifier. **\$2.95**
 BOTH BRAND NEW. BOTH FOR ONLY.

TG-10 CODE KEYS. Push-pull 6L6 amplifier, variable speed. Complete with tubes and reel. Approx. wt. 65 lbs. Excel. cond. **\$14.95**

TG-34 CODE KEYS. Used **\$14.95** New **\$24.50**

New! Boxed! **TRANSFORMERS! 110 V. 60 cycles!**
375-0-375 @ 250 ma. 5 V. @ 4 amps. 6.3 V. @ 5 amp. \$4.95
200-0-200 @ 20 ma. 5 V. @ 2 amps. 6.3 V. @ 1 amp. .49
2.5 CT-2.5 CT 5 amps each winding. .95
6.3 V. CT @ 5 amp. 2.95
TUBE TESTER PLATE & FILAMENT TRANSFORMER: Used in I-177. Multi-tapped for all voltages **3.95**

VIBRATOR TRANSFORMER: 6-12-24 V. with 200 cycle vibrator. 120 V. @ 150 ma; 120 V. @ 150 ma; 11 V. @ 450 ma. **.98**

KW PLATE TRANSFORMER: 4700 V CT @ 450 mls. Pri. 115 V. 60 cycles. New, original box **24.50**

2 V. 20 AMP. HR. WILLARD WET CELL BATTERY New, boxed **\$1.95**

6 V. 15 AMP. HR. NAVY STANDARD BATTERY. 4 1/2" x 7" plastic case. New. Only **\$3.95**

APN-1 FM WOBULATOR. Use for building TV, FM-AM sweep generator. With conversion done. **\$5.95**

6 V. CONTROL RELAY. Brand new! Ea. **\$.99**

6 V. CONTROL RELAY. Brand new! Ea. 99c. 3 for \$2.75

6 V. CONTROL RELAY. 7TDT. New. Stock up! Each **\$1.29**

CHEST MIKE! CHROME PLATED!

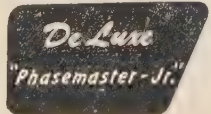
Late model SWIVEL-TYPE horn. Has F1 **\$1.49**
 Putton for hi audio output. New Special! Ea. 2 for **\$2.49**

HS-33 HEADSET. Used **\$1.95**

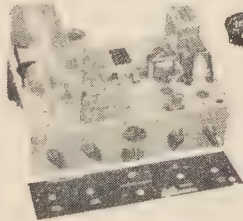


ELECTRONICS
 2251 W. WASHINGTON BLVD.
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I GOT BIT BY THE SINGLE-SIDEBAND BEE!



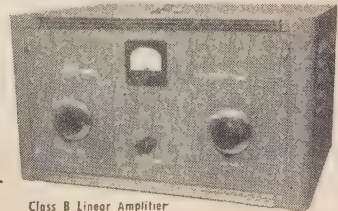
A complete 50 watt exciter-transmitter for SSB, AM, PM & CW. Wired and tested with tubes and power supply. **\$194.50**



A complete 50 watt exciter-transmitter for SSB, AM, PM & CW. Wired and tested but less tubes and power supply. **\$92.50**
 KIT FORM \$74.50

POWER AMPLIFIER P-500

A completely shielded, wired and tested linear amplifier - 2 knob tuning, tunes 80 thru 10 meters - NO plug in coils or band-switching - supplied with built in filament supply and tubes - matches 52 - 600 ohm antennas - Less HV supply. 500 watts **\$197.50**



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NOVICE SHACK

[from page 31]

was an S-53A, later replaced with an NC-98—both are good. . . . Pardon my mentioning it, but I owe my mastery of the code to consistent copying of the W1A code-practice sessions."

"Doc" Metke, KN6HLO, 511 Oak St., Roseville, Calif. reports; "I am ten years old and have had my license for ten days. I run about 75 watts to a Lysco 60. Antenna is 130 feet long and 60 feet high, centered with RG-8/U coaxial cable, and the receiver is an HC 120X. So far I have had 12 contacts on 3.7 Mc. . . . My Dad, W6SUP, and my Mother, K6GKR, let me operate only one hour a day on school days, but I can get on more on Saturday and Sunday. Dad says I can get on 7 Mc. in about two months."

Dick Maher, WNØVZI/Ø, 2325 South 10th, Lincoln, Nebr., says; "I note that Nebraska is rarely mentioned in the Novice Shack; so I decided to write. My transmitter uses a 6AG7 driving a 6L6 to 35 watts input, and my receiver is an S-38C. I will be glad to set up schedules with anyone needing Nebraska, and I will be happy to help anyone in the Lincoln area with his code."

Help Wanted

Diane Garlock (15), 902 N. Harrison, Mason City, Iowa.

Robert W. Meyer, R. 5, Box 83A, Stockton, Calif. Phone 13FB.

Hugh Bonney (13), 15 W. Chestnut St., Mount Vernon, Ohio.

Joe Procek (15), 138 Peach St., Catasaugus, Pennsylvania.

Charles Edward Barbare (17), General Delivery, Crestview, Fla.

Frank Skiles (16), R.R. 1, Box 301, Savanna, Ill.

Pvt. D. M. Richmond, RA-1640823, H & S Co., 73rd Tank Bn., APO 7, c/o Postmaster, San Francisco, Calif. (Has passed his Novice examination, but he still does not have his license. He and his Ham buddies would appreciate receiving literature on Ham radio. Dave will answer all letters received.)

Each month CQ lists the names and addresses of prospective amateurs needing assistance with code or theory. To have your name listed, please address your request to: Herb Brier, W9EGQ, 385 Johnson St., Gary 3, Indiana. Requests received by December 15 will appear in the February issue.

Azad M. "Dom" Dombourian, W5ZNI, 7800 Washington Ave., New Orleans, La., reports; "The Greater New Orleans Amateur Radio Club has code and theory classes every Monday and Wednesday at 8:00 p.m. They are held in the Physics Building of Loyola University. Loyola was kind enough to supply the room, and the U.S. Navy lends us film and other necessary materials. This year's class started with 115 students, 15 to 20 being women. Last year, we graduated about 30 out of the 100 who started. There are no restrictions and no costs."

Hank Jung, W3YLL, 213 N. 10th St., Philadelphia, Pa., says; "In three months as a Novice I worked 22 states. In two months as a General, I have added one more towards my WAS (Worked All States), which leads me to believe that I should have stayed a Novice. hi. I'm usually on 3695 kc. after 2:00 a.m. (I work the swing shift) and call 'CQ WN'; so would welcome call from any Novice who needs a W3 or Pennsylvania contact. My transmitter is now a 6AG7-6L6 running 2

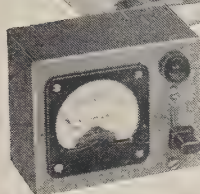
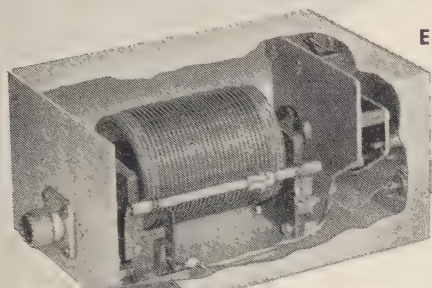
[Continued on page 30]

*Another
Master
Must!*

NEW! MASTER-MATCHER!

WITH BUILT-IN FIELD STRENGTH METER...

**AUTOMATICALLY TUNES THE
ENTIRE BAND... FROM THE DRIVERS SEAT!**



Here! — the latest, most valuable instrument for all Hams! The remote controlled band-matcher tunes your mobile antenna to exact operating frequency. Just flip the switch, presto!... the Master-Matcher goes to work! QSY in any particular band without jumping out of your car to adjust the antenna loading coil. No guesswork!... built-in **FIELD STRENGTH METER**. Peak performance from your antenna! The panel light automatically indicates when roller is at minimum inductance position. Available in 6 and 12 volt models.....

Complete

Net **24⁹⁵**



Master Mobile Mounts, Inc.

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AT LEADING
RADIO JOBBERS
EVERYWHERE

Read why your fellow Hams prefer the TURNER 80

"Have had many compliments on its speech quality from many Hams."

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"Can't be beat in its price field."

D. W. Truax, W6BLK, National City, California.

"Just what I've been waiting for—a small mike at a popular price."

Oliver Martin, W1TNF, Franklin, N. H.

Comments like these are volunteered by Hams all over America —men like yourself who know a good microphone when they use one. The slender, graceful Turner 80 is a big performer within its frequency range of 80 to 7000 cps. Especially sensitive to voice... with an output level of about -54 db. The high-quality Bimorph moisture-sealed crystal is blast and mechanical shock proofed. Case is die-cast zinc alloy, satin chrome plated. Seven foot attached cable included. Matching C-4 stand available, holds microphone firmly in place.

Turner Model 80, List Price\$15.95

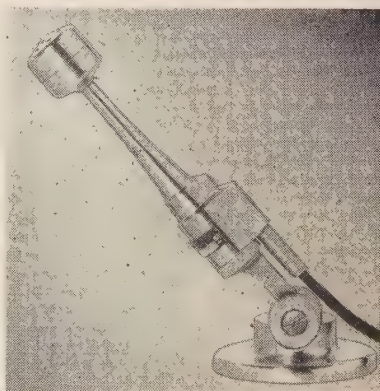
Turner Matching C-4 Stand (shown), List Price..... 5.75

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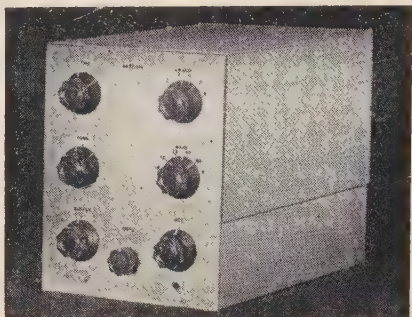
Gentlemen: Please send me complete information on the Turner 80 microphone and matching C-4 Stand.

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VALENCO 140 R.F. UNIT

- 180 Watts Max. (140 W. if amplitude modulated)
- 3.5 through 30 MC
- 6CL6-5763-Parallel 6146's
- Crystal or Your External VFO
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- Pi Network Output

Kit \$74.50 Factory Wired \$89.50

Power Supply—Kit \$54.95 Wired \$64.95

for further information write

VALLEY ENGINEERING COMPANY

Box 2, Los Alamos, New Mexico

watts, and the receiver is an NC-183D. The receiver is hardly compatible with my present transmitter, but I am building a new 90-watt one."

Steve Case, WNTWSS, RFD #1, Vernal, Utah, reports: "In one month as a Novice I have worked 27 states, with 22 confirmed. Man! Does that TR-75TV get out. My NC-57 does a good job, too. I don't think my record is too bad, considering I have football practice every night, and I work at broadcast station, KJAM, after school until 2200, when I get on 7198 Mc. Most of the stations I work say I am their first Utah contact."

Don Borson, WN0TJH, Ytterboe Hall, St. Olaf College, Northfield, Minn., writes: "I have had my Novice license for five months, but I have been on the air for only 2½ months. In that time, I have worked 85 Hams in 15 states. Nothing to brag about, but I'm satisfied. At first I was on 3.7 Mc.; then I switched to 7 Mc., which is much better for pulling in new states. . . . My transmitter is a TBS-50, my receiver is an NC-88, with separate ½-wave antennas for the two bands."

Ron Yantz, WN1AZN, R.D. #1, Jericho, Vt., makes two offers: "I'll be glad to arrange a schedule with anyone needing Vermont for WAS, and I imagine there are a few, hi. Also, I offer to help any prospective amateur in learning the code, if he has access to a tape recorder and is willing to conduct practice sessions from far off by tape. . . . At present, I run 60 watts to a six ½-wave 'V' beam antenna on 7 Mc."

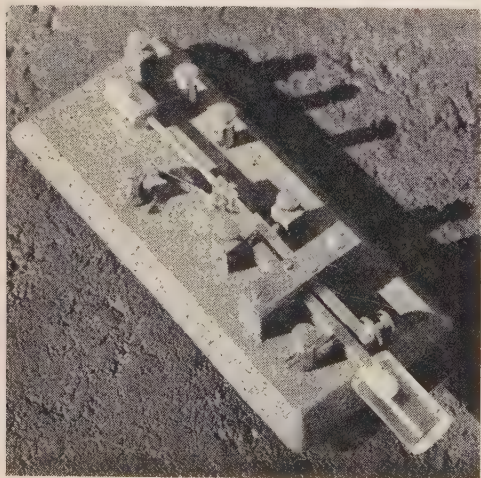
Coincidentally, I received letters from two readers in Gothenburg, Sweden, within a few days. The first one is from Mr. Sture Christianson, Klareborgsgatan 14, Gothenburg V, Sweden. He writes: "My interest for radio came one night when I didn't know what to do. Then I came to think of the radio near me. I had never listened in to the short waves before, but this night I did. Yes, I became a DX'er that night and now I am studying for my license. I would like very much to have a pen pal among the Novices over in the U.S.A."

Kjell Drotz, Sodra Kustbanegatan 57B, Gothenburg 6, Sweden, writes: "I am 17 years old, and I have been interested in radio for two years. I am only a listener for the present, but I hope to get my license in the winter. . . . I would very much like to get a pen pal in the U.S.A., possibly a YL."

Again I have used all my space, but before I go, let me wish each and every one of you a Merry Christmas.

Keep your letters and pictures coming. 73, Herb.

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Shipping 4
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COMMON SENSE ANTENNA DESIGN

[from page 14]

point in the circuit to a lower voltage point, as the capacity between Z and ground is increased in relation to the total tuning capacity. Of course the "outer" capacitor is varied to maintain resonance. For a balanced two-wire system, the two inner condensers may be ganged, and the two outer condensers ganged with their rotors electrically separated; but for unbalanced lines, four separate capacitors will be preferable when using the circuit depicted here.

Preliminary adjustments for the single-wire feed system, using tuner circuit 4a, might be as follows:

[Continued on page 62]

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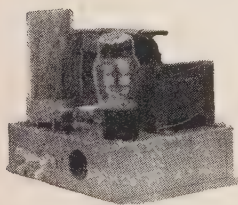
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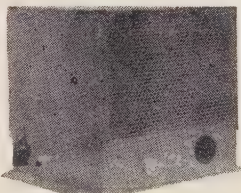


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1. Connect tap "X" (the hot lead of the transmitter output line) one or two turns from the grounded end of the coil.
2. Connect "Y" on the coil at a point where resonance (maximum neon bulb brilliance) is reached at some appropriate capacity setting.
3. Connect "Z" on the coil about 5 turns from the ground end (more if the antenna impedance is known to be high, and less if the antenna impedance is known to be very low.)
4. Retune the capacitor for resonance:
Caution: Keep the transmitter resonated during all of these adjustments, and avoid r-f burns by not touching "hot" circuit points while the transmitter is on. If these adjustments interact too seriously with the transmitter adjustments, loosen the coupling at the transmitter, or tap "X" closer to ground.
5. Now observe:

- A. If step four requires less capacity than was used in step two, the antenna is capacitive.
- B. If step four requires an increase in capacity, the antenna is inductive.
- C. If the tuning at step four is very broad, the Q of the tuner is low.
- D. If the tuning at step four is sharp, and connecting the antenna had little effect on adjustment, the Q is high: the antenna is not taking much power.

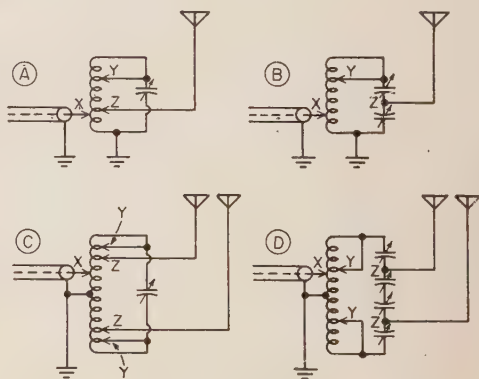
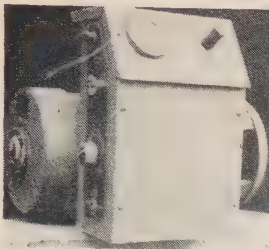


Fig. 4. Some of the antenna tuners described in the text.

For the two-wire system, Fig. 4c, a similar process is used. Although 4c shows a single-section capacitor, a split-stator unit may be preferable; but if this is used, no ground should be placed on the capacitor rotor. A virtual ground will appear here, reducing hand capacity effects and unbalance through stray circuit components; although the rotor may be "hot" with some incorrect adjustments. If the single-section capacitor is used, an insulated shaft is required to prevent r-f burns from the condens-



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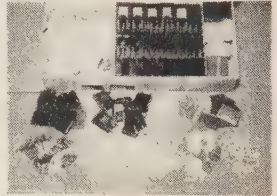
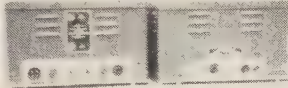
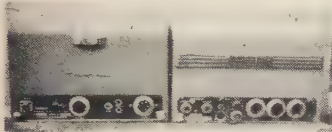
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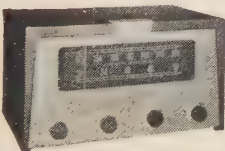
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[from preceding page]

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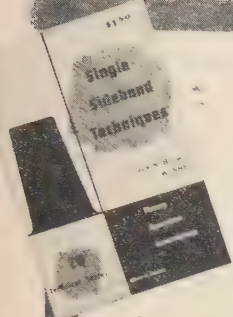
er shaft, and to avoid "hand capacity" effect on tuning.

The "Y" taps for the two-wire system should be equidistant from ground. The "Z" taps will be equidistant if the system is balanced, but if not, the lower impedance (to ground) feeder will tap closer to the grounded point on the coil.

After the initial adjustments, keep varying any necessary taps until proper transmitter loading is obtained with about the same settings of transmitter controls as those recorded while feeding the dummy. Be sure the Q is not too high. Adjusting any of the taps will affect the Q and the loading. The transformer action between the X and Z taps is not as predictable as we might wish, so that no fixed relationship between "turns ratio" and "impedance ratio" may be delineated for this type of transformer. Patience, and a little luck, will probably produce as effective an adjustment of the tuner as expensive instruments and special knowledge. The exact process is seldom the same for two cases, but the experience gained in evolving your own best procedure will be valuable. If the antenna is very short, it will require frequent retuning when you change frequency regardless of how the tuner is adjusted.

It takes a long time to evaluate an antenna. One station (100 watts) used a slanting 70-foot doublet (balanced) with a 22-foot open wire feedline, to work all continents except Asia on 3.5 Mc. A 600-foot balanced doublet with 220 feet of open-wire feedline has been observed to give excellent signals, although with considerable directivity as might be expected. A nearly horizontal 125-foot flat-top, with a single-wire feeder about 25 feet long attached approximately 45 feet from one end, has put good signals into New Zealand and Africa on 80 meters, even though these areas lie directly off the ends of the flat-top. Not designed primarily for DX, all of the above antennas have been used to work 48 states during one weekend on 80 and 40 meters, running 100 watts. This transmitter had a pi-section output network, but a separate antenna tuner was found advantageous.

Poor signal reports don't necessarily mean poor signals, unless they are comparative reports, or averages over long periods of time. Unanswered calls may mean that you are not "working out," but they may also mean calls which were not made intelligently. While calling a station, imagine what *he* is doing. When you picture his receiver dial hitting your frequency, wind up the call. If he's not there, try to figure out *why*! Any of the antennas suggested here, when properly located and correctly tuned, should produce a high average percentage of answered calls, and good signal reports.



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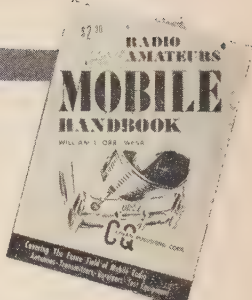


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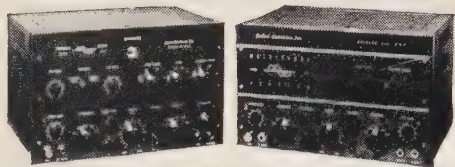
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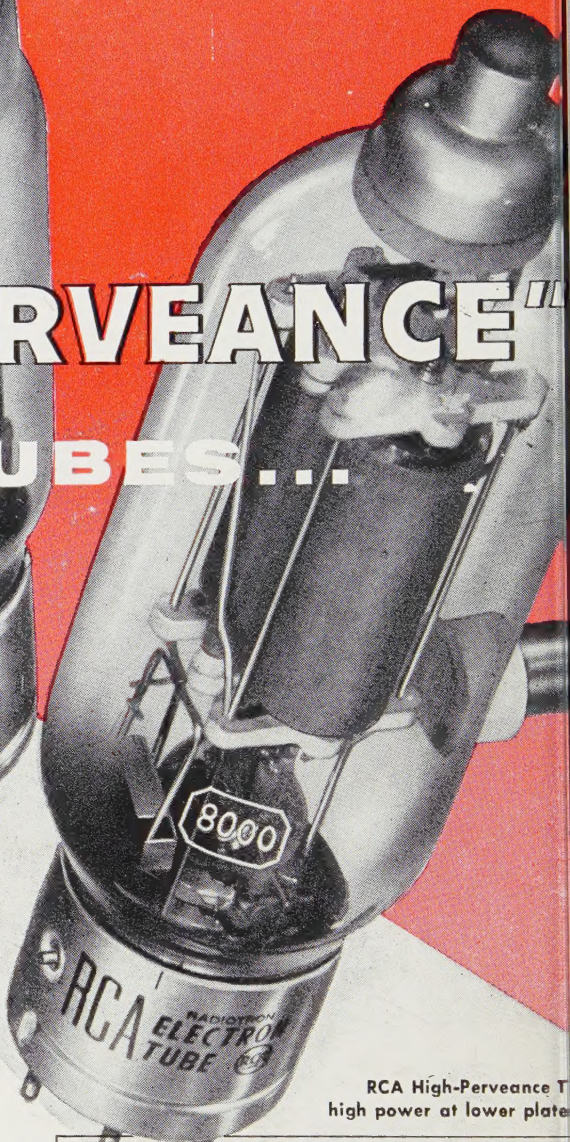


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829B	Twin Beam Power	120*	750
832A	Twin Beam Power	50*	750
833A	Triode	1000	3300
5763	Beam Power	17	350
6146	Beam Power	90	750
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